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BOTANICAL EXTRACTS:

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PHILOSOPHY OF BOTANY.

TIME AND SCIENCE UNFOLDING NATURE.

LIBRARY OF THE BOMBAY BRANCH OF THE ROYAL ASIATIC

INCRESCUNT QUOTANNIS SCIENTIÆ, EMENDANTUR QUOTIDIE, ET AD FASTIGIUM SUUM OPTATUM SENSIM SENSIMQUE, PLURIUM VIRORUM OPERA ET STUDIO JUNCTIS, FELICITER PROPERANT.—THUNBERG.

BY

ROBERT JOHN THORNTON, M. D. F. M. S. &c.

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SECT. XXXV.

ON THE NATURALIZATION OF PLANTS.

The vegetable world, each plant and tree,
Its seed, its name, its nature, its degree,
I'm allow'd, as Fame reports, to know;
From the fair *cedar* on the craggy brow
Of Lebanon nodding supremely tall,
The creeping *moss*, and *hyssop on the wall*;
Yet, just, and conscious to myself, I find,
A thousand doubts oppose the searching mind.
I know not why the *beech* delights the glade,
With boughs extended and a rounder shade;
Whilst tow'ring *firs* in conic forms arise,
And with a pointed spear divide the skies;
Nor why, again, the changing *oak* should shed
The yearly honour of his stately head;
Whilst the distinguish'd *yew* is ever seen,
Unchang'd his branch, and permanent his green.
Wanting the sun why does the *caltha* fade?
Why does the *cypress* flourish in the shade?
The *fig* and *date*, why love they to remain
In middle station, and an even plain;
While in the lower marsh the *gourd* is found,
And while the hill with *olive*-shade is crown'd?
Why does one climate and one soil endue
The blushing *poppy* with a crimson hue,
Yet leave the *lily* pale, and tinge the *violet* blue?
Why does the fond *carnation* love to shoot
A various colour from one parent root;
While the fantastic *tulip* strives to break
In two-fold beauty and a parted streak?
The twining *jasmine*, and the blushing *rose*,
With lavish grace their morning scents disclose;
The smelling *tub'rose* and *jonquil* declare,
The stronger impulse of an evening air.
Whence has the tree (resolve me) or the flow'r,
A various instinct or a diff'rent pow'r?
Why should one earth, one clime, one stream, one breath,
Raise this to strength, and sicken that to death?

PRIOR'S SOLOMON.

LIBRARY OF THE BOMBAY BRANCH OF THE ROYAL ASIATIC SOCIETY

CORN, which serves for the general subsistence of the human race, is not produced by vegetables of a lofty stature, but by simple grasses. The principal support of human life is borne on *herbage*, and is exposed to the mercy of every breath of wind. There is reason to believe, that had we

ourselves been entrusted with the safety of our crops, we should not have failed to place them on great *trees*; but in this, as well as in every thing else, we are bound to admire *Divine Providence*, and to mistrust our own wisdom. Had our harvests been the produce of the *forests*, in the event of these being destroyed by war, or set on fire through our own imprudence, or rooted up by the winds, or ravaged by inundations, whole ages would have been requisite to reproduce them in a country. Farther, the fruits of trees are much more liable to drop off than the seeds of grasses. The *grasses*, as has been already observed, carry their flowers in an ear, in many cases surmounted by little beards, which do not defend their seeds from the birds, as Cicero says, but which serve, as so many little roofs, to shelter them from the water which falls from heaven. The drops of the rain cannot drown them, as they do flowers radiated, in disks, in roses, and in umbels, the forms of which, however, are adapted to certain places and to certain seasons; but those of the grasses are adapted to every exposure.

When they are borne in flowing and drooping plumes, such as those of most grasses of hot countries, they are sheltered from the heat of the sun; and when collected into an ear, as those of most grasses of cold countries, they concentrate his rays on at least one side. Farther, by the suppleness of their stems, strengthened by joints from distance to distance, and by their filiform and capillaceous leaves, they escape the violence of the winds. Their weakness avails them more than strength does the great trees.

They farther resist the effect of excessive dryness by the length of their roots, which go, in quest of moisture, a great way under ground; and though their leaves are narrow, they have them in such numbers, that they cover the face of the ground with foliage endlessly multiplied. At the slightest shower, you see them all rear themselves into the air at their extremities, as if they were so many claws. They even resist conflagration, which consumes so many trees in the forest. I have seen countries in which they every year set the herbage on fire, in the season of drought, recover themselves, as soon as it rained, with the most lovely verdure. Though this fire be so active, as frequently to devour, root and branch, the trees which come into contact with it, the roots of herbage sustain no injury from it.

It is in this cosmopolite family, if I may be allowed the expression, that Nature has placed the principal aliment of man; for the various species of corns, on which so many human tribes subsist, are only so many species of

grasses. There is no land on the globe where some kind of corn or another may not be raised. Homer, who had studied nature so accurately, frequently characterizes each country by the vegetable peculiar to it. One island he celebrates for its grapes, another for its olive-trees, a third for its laurels, and a fourth for its palms; but to the earth only he gives the general epithet of ζειδωρα, or *corn-bearing*. Nature, in fact, has formed it for growing in all situations, from the Line to the very border of the Frozen Ocean. One species is adapted to the humid places of warm countries, as the *rice* of Asia, which grows in vast abundance in the muddy swamps by the sides of the Ganges. Another is suited to the marshy grounds of cold countries; such is a kind of *false-oat*, which naturally grows on the banks of the rivers of North-America, and of which many savage nations annually raise immense crops.*

Other kinds of corn thrive wonderfully well on warm and dry lands, as the *millet* and the *pannick* of Africa, and the *maize* of Brazil. In our climates, *wheat* agrees best with a strong soil, *rye* with a sandy one, *buck-wheat* with rainy declivities, *oats* with humid plains, *barley* with stony ground. *Barley* succeeds in the very bosom of the north. I have seen, says St. Pierre, as far up as the sixty-first degree of north-latitude, amidst the rocks of Finland, crops of this grain as beautiful as ever the plains of Palestine produced.

Corn affords an abundant supply to all the necessities of man. With its straw he enjoys the means of lodging, of covering, of warming himself, and of feeding his sheep, his cow, and his horse; with its grain he can compound aliments and liquors of every flavour. The northern nations brew it into beer, and distil from it strong waters, more potent than those from wine; such are the distillations of Dantzick. The Chinese† extract from rice a wine as agreeable as the best wines of Spain; and the Brazillians prepare their *ouicou* with maize.

We may distinguish, in the barley and the oats, the elementary characters which have been formerly indicated, and which vary the species of plants of the same genus, in a conformity to the situations where they are designed to grow. The barley destined to dry places has leaves broad and

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* Consult Father Hennepin, a Franciscan; Champlain, and other travellers through North America.

† Journey to China, by Isbrand-Ides.

open at their base, which convey the rain-water to the root of the plant. The long beards which surmount the coat that is wrapped round the grain, are bristled with denticulations, very much adapted to the purpose of making them adhere to the hair of animals, and of resowing them in lofty and dry situations. The oats, on the contrary, destined to humid places, have narrow leaves, gathered close around the stem, in order to intercept the rain-water. The coats of this plant distended, similar to two long half-bladders, and not very closely adhering to the grain, render it proper for floating, and crossing the water by the help of the winds.

Some plants, we observe, are natives of *one climate* alone,* others seem destined *as the inhabitants of every part of the earth.* PLINY, who has preserved to us the origin of the *fruit-trees* which were in Italy in his time, informs us, that most of them had been imported from the islands of the Archipelago. The *walnut* came from Sardinia; the *vine*, the *fig-tree*, the *olive*, and many other fruit-trees, were natives of the other islands of the Mediterranean. Nay, he observes, that the *olive-tree*, as well as several other plants, thrives only in the vicinity of the sea. All modern travellers confirm these observations. *Tavernier*, who had so many times traversed the Asiatic continent, assures us, that no olive-trees are to be seen beyond Aleppo. An English traveller positively asserts, that no where, on the Continent, are there to be found fig-trees, vines, mulberries, as well as many other fruit-trees, that can be compared, either as to magnitude or fertility, with those of the Archipelago, notwithstanding the carelessness and indolence of the wretched possessors. To these I might add a great many other vegetables, which thrive only in those islands, and which furnish to the commerce of Europe, gums, mannas, &c. The apple-tree, so common in France, produces no where such fine fruit, and of species so varied, as on the shores of Normandy, under the breath of the sea-breeze from the west. I have no doubt that the fruit which was proposed as the prize of beauty had, like *Venus* herself, some favourite *Isle*.

* Thus it is, that Arabia produces, or, in more appropriate language, placed by a kind DEITY, the *Camel* and *Dromedary* are to be found adapted for those burning sands, which they can traverse heavily laden, without drinking, having a reservoir within themselves; the *Lamas*, in Peru, destined for climbing; the *Kangaroo* of Botany Bay; the *Reindeer* of Lapland, which feeds on the lichen, and has its feet adapted for the snow; the *Rhinoceros*, who, in the marshes of Asia, by means of its soles can disengage itself with ease; the *Elephant*, approaching to humanity by means of reason, &c. How far all or any of these can be naturalized to our climates, or colonies, remains to be proved.

If we carry our remarks even into the Torrid Zone, we shall find that it is neither from Asia, nor from Africa, that we obtain the clove, the nutmeg, the cinnamon, the pepper of the best quality; the benzoin, the sandal-wood, the sagoe, and many others, but from the Molucca *Islands*, or from those which are in the same seas. The cocoa-tree attains its perfect beauty only in the Maldivia *Islands*. Nay, there are, in the archipelagos of these seas, a great number of fruit-trees described by *Dampier*, which have not yet been transplanted into the Old Continent; such as the grape-tree. The double cocoa is to be found only in the Sechelles *Islands*. The *islands* recently discovered in the South-Sea, such as that of Taïti, have presented us with trees hitherto unknown, as the bread-fruit, and the mulberry-tree, the bark of which serves to make cloth. As much may be said of the vegetable productions of the islands of America relatively to their continent.

The finest species of corn, therefore, which is wheat, might be referred to *Sicily*, where, in fact, they pretend it was originally found. Fable has immortalised this discovery, by making that island the scene of the amours of *Ceres*, as well as the birth of *Bacchus*, in the isle of Naxos, because of the beauty of its vines. This much is certain, that corn is no where *indigenous* but in *Sicily*, if it should be found it still re-perpetuates itself there spontaneously, as the ancients affirm.

It would be worth the farmer's while to study the varieties of wheat, and soil which each seems best to thrive in. In general, all *wheat* succeeds best upon strong soils, particularly if they have been well drained, so that the corn lies dry; but as *some sorts of this grain thrive better in some soils than others*, it might redound to the public welfare if more accurate observations were made in regard to each kind. The *white egg-shell wheat* is reckoned best for light land, and to sow with rye for meslin; because it ripens soonest. It is indeed of little use in this country for this purpose, as a mixture of wheat and rye flour is not esteemed here. This wheat should be the earliest in the ground: it is much sown in Essex upon their hazely loams, or brick earths: as the *red wheat* and the *Poland bearded wheat* are also, both there and in this county, upon stiff yellow clays. The *white Poland*, or *Pole-rivet*, has not a hollow straw, and is therefore not so subject to lodge, as other corn that has. This kind is particularly fit for lands where the crop is apt to run much to straw.

In *Oxfordshire* they have a sort of wheat, which they call *long-cored wheat*, and reckon the best for rank clays. Its straw not being hollow, it

is the less liable to lodge; and farmers observe it is the least apt to be mildewed, or to be eaten by birds, from which last it is greatly guarded by its long rough awns; but the flour of it is somewhat coarse. Their *white kind of red-grained wheat* is a very good sort for clayey land: it yields a good crop, and seldom smuts.

In *Staffordshire* they reckon the *red Lammas*, or *bearded wheat*, the best for cold lands, or stiff clays.

In *Berkshire* they have a sort called *pendulum-wheat*, from the hanging of its ears, much like the cone-wheat.

In *Northamptonshire* they have a sort of wheat with a *white straw*, and *reddish ear* and *grain*, much commended for the plumpness and largeness of the grain, and strength of the straw, which prevents its being subject to lodge; nor is it apt to be eaten by birds. They have also a *red-eared bearded wheat*, and a sort of *pollard*, or *duck-bill wheat*, as it is called, known in *Sussex* by the name of *fuller's wheat*, which has so close and thick a husk, that the birds never injure it. Mr. Miller observes, that this sort of wheat grows very tall, and if it be sown too thick, is very apt to be lodged by rain and wind; for that its ears are large and heavy, and inclined on one side, as the grain increases in weight; but that if its roots are at a proper distance from each other, it will tiller greatly, and have strong stalks, and that the grain of this wheat yields more flour in proportion than that of any other sort. The awns of this wheat always drop off when the grain is full grown.

Smyrna-wheat, commonly called *many-eared wheat*, because several lesser, or collateral ears, grow around the bottom of the main ear, which is very large in its state of perfection, requires more nourishment than the common husbandry can give it, and therefore is not cultivated by our farmers: but it would probably do extremely well with the horse-hoeing husbandry, where the quantity of pabulum can be enlarged almost at pleasure. For the same reason, *maize*, commonly called *Turkey*, or *Indian Corn*, is fitted for this last husbandry, as will be more particularly noticed hereafter.

Some gentlemen have been curious enough to procure their seed-wheat from Sicily, and it has succeeded very well as to growth; but the grain of this species has proved too hard for our English mills properly to grind.

Mr. *Boys*, of Betshanger, near Sandwich, in Kent, has given us the

following particulars respecting some comparative trials of different kinds of wheat made by him, viz.

	Qrs.	Bs.	Gs.
Hoary white, produced per acre	3	4	3
Fulham ditto	3	4	2
White straw ditto	3	4	0
Yellow Lammas ditto	3	0	0
Brown ditto ditto	2	7	4

In another year's trial, still the *hoary white* kept the superiority, both in point of quantity and price; having fetched one shilling and one shilling and sixpence per quarter more, at market, than any of the other kinds. Mr. *Boys* says, these trials were all made on the same field, the soil exactly the same, all sowed in one day, managed precisely in the same manner, laid separately in the barn, and carefully threshed and measured.

It is to be observed, that the soil in that part of the country is very light, so that the *hoary white*, which succeeded so well here, might not be so successful on a strong soil. The *Fulham*, which in this trial approaches nearest to the *hoary-white*, Mr. *Boys* says, is a coarse wheat, with thick bran, and of inferior value. He adds, that the *egg-shell-white* is a good deal in use in that part of the country; but that he does not approve of it, from the facility it has of dropping its grain in the field, which would not suit his bleak and exposed situation; otherwise, it is a species much esteemed by the millers.* Perhaps this defect might be overcome by reaping it somewhat sooner than common.

Respectable and useful as every branch of the husbandman's art certainly is, no one part is more interesting to the public, or more likely to prove advantageous to those who may be so fortunate as to succeed in it, than that of inuring plants, natives of warmer climates, to bear, without covering, the ungenial springs, the chilly summers, and the rigorous winters, by which, especially for some years past, we have been perpetually visited.

Many attempts have been made in this line, and several valuable shrubs, that used to be kept in our stoves, are now to be seen in the open ground: there is, however, some reason to believe, that several of these were

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* Lond. Soc. Trans. Vol. III. p. 19, &c. For the varieties of wheat consult the last edition of Miller's Gardener's Dictionary.

originally the native of a colder climate, though introduced to us through the medium of a warm one; as the *Gold-tree* (AUCUBA JAPONICA), the *Moutan* (PÆONIA FRUTESCENS), and several others.

In the case of annuals, however, it is probable that much has been done by our ancestors, and something by the present generation; but it must be remembered, that all that is required in the case of an annual, is to enable it to ripen its fruit in a comparatively cold summer, after which, we know that the hardest frost has no power to injure the seed, though exposed in the open air to its severest influence; but a perennial has to encounter frosts with its buds and annual shoots, that have sometimes been so severe with us as to rend asunder the trunks of our indigenous forest trees.*

It is probable that *wheat*, our principal food at present, did not bring its seed to perfection in this climate, till hardened to it by repeated sowings; a few years some *spring wheat* from *Guzerat* was sown with barley, in a well-cultivated field: it rose, eared, and blossomed, with a healthy appearance; but many ears were when ripe wholly without corn, and few brought more than three or four grains to perfection.

Seed is often changed from cold to warm soils, and always with success. In this case, the plant may be said to have undergone a change from a cold to a more temperate climate; a circumstance of itself almost sufficient to insure a crop superior, both in quality and quantity, to what could be expected, if seed accustomed to the same soil and climate were continued to be sown for a great number of years.

It is also a common and a very proper practice, to change seed from early to late soils, and from a superior to an inferior climate. From the natural earliness of such seed, a farmer may delay sowing his fields for ten or fifteen days, and at the same time depend upon reaping his crop as soon as if he had sown it at the ordinary season with seed that had been long used to the soil and climate. By changing seed from early to late soils and climates, a farmer frequently has it in his power to obviate the losses and difficulties which otherwise are inseparable from a bad seed-season. If the weather prove so wet and rainy, during the period when he usually sows his grain, as to prevent him from doing so with propriety, and afterwards becomes favourable, by procuring seed that comes so much sooner to maturity, he

* See Miller's Dictionary, article *Frost*.

may be said to have accomplished the operations of seed-time in due season.

There is an advantage resulting from changing seed from soils of opposite natures, which cannot be depended on when the change is made from similar soils. Some weeds will grow only in strong deep lands, while others are peculiar to light and sandy soils. When, from whatever cause, grain abounds so much with the seeds of weeds, as to render it improper for sowing, by procuring seed from a soil of an opposite nature, the farmer is, to a great degree, certain that no dangerous seed-weeds will be introduced by the change.

Grain, like all other seeds and plants, when brought from a warmer to a colder climate, gradually degenerates till, by being frequently cultivated, it becomes natural both to the soil and climate. And it is found from experience, that it degenerates sooner, and to a greater degree, in mountainous districts, than in the level and better-sheltered parts of the country. At the same time, it is well known, that many vegetables introduced from other countries, and which it was once thought would not come to maturity in Great Britain, have, by proper care and attention, been brought to a great degree of perfection. It is said, that some of Oliver Cromwell's officers first introduced white oats into Scotland. Previous to his overrunning that kingdom (about 150 years ago), the oats generally cultivated in the now highly improved county of Berwick, were of the grey species, such as are still common in the highland districts. This circumstance, more conclusive than a thousand arguments, proves how much the quality of grain may be improved by proper attention; and further, that frequent and judicious changes of seed are of the greatest importance in effecting this improvement.

The long and established practice, and the acknowledged advantages derived from annually importing seed-wheat from England, into all the districts in Scotland, where that species of grain is cultivated, are well known. It is a practice no less general, although more local, for the farmers in Banffshire, where deep strong cold soils prevail, to procure, in unfavourable seasons, a great portion of the oats necessary for seeds from the light dry sandy soils in the adjoining county of Moray. Were it proper to enter into a particular detail of the practice of other districts where improved agriculture is to any considerable degree established, it would be found that frequent changes of seed are, for one or other of the reasons above mentioned,

considered not only highly proper, but indispensably necessary. As this practice has therefore, from long and extensive experience, been proved beneficial, it ought to be particularly attended to by the proprietors and farmers of all ranks, in every part of the island where improvements have only been recently or but partially introduced.

In the year 1791 some seeds of *Zizania aquatica* were procured from Canada, and sown in a pond at Spring Grove, near Hounslow: it grew, and produced strong plants, which ripened their seeds; those seeds vegetated in the succeeding spring; but the plants they produced were weak, slender, not half so tall as those of the first generation, and grew in the shallowest water only; the seeds of these plants produced others the next year sensibly stronger than their parents of the second year.

In this manner the plants proceeded, springing up every year from the seeds of the preceding one, every year becoming visibly stronger and larger, and rising from deeper parts of the pond, till the last year, 1784, when several of the plants were six feet in height, and the whole pond was in every part covered with them as thick as wheat grows on a well managed field.

Here we have an experiment which proves, that an annual plant, scarce able to endure the ungenial summer of England, has become, in *fourteen generations*, as strong and as vigorous as our indigenous plants are, and as perfect in all its parts as in its native climate.

Some of our most common flowering shrubs have been long introduced into the gardens; the *Bay-tree* has been cultivated more than two centuries; it is mentioned by Tusser, in the list of garden plants inserted in his book, called Five Hundred Points of good Husbandry, printed in 1573.

The *Laurel* was introduced by Master Cole, a merchant, living at Hampstead, some years before 1629, when Parkinson published his Paradisus Terrestris, and at that time we had in our gardens *Oranges*, *Myrtles* of three sorts, the *Laurustinus*, *Cypress*, *Phillyrea*, *Alaternus*, *Arbutus*; a *Cactus* brought from Bermudas, and the *Passion Flower*, which last had flowered here, and showed a remarkable particularity, by rising from the ground near a *month sooner* if a *seedling* plant, than if it grew from roots brought from Virginia.

All these were at that time rather tender plants: Master Cole cast a *blanket* over the top of the *Laurel*, in frosty weather, to protect it; but though nearly two centuries have since elapsed, not one of them will yet bear with certainty our winter frosts.

Though some of these shrubs *ripen* their *seeds* in this climate, it never has been, I believe, the custom of gardeners to *sow them*; some are propagated by *suckers* and *cuttings*, and others by *imported seeds*; consequently the very identical laurel introduced by Master *Cole*, and some others of the plants enumerated by *Parkinson*, are now actually growing in our gardens; no wonder then, that these original shrubs have not become hardier, though probably they would have done so had they passed through several generations by being raised from British *seeds*.

Is it not then worthy a trial, as we find that plants raised from suckers or cuttings do not grow hardier by time, and as the experiment on zizania points out the road, to sow the *seeds* of these and such like tender shrubs as occasionally ripen them in this climate? Fourteen generations, in the case of the *zizania*, produced a complete habit of succeeding in this climate, but a considerable improvement in hardiness was evident much earlier.

In plants that require some years to arrive at puberty, fourteen generations is more than any man can hope to survive: but a much less number will in many cases be sufficient, and in all, though a complete habit of hardihood is not attained, a great progress may be made towards it in a much less time; even one generation may work a change of no small importance: if we could make the *Myrtle* bear the climate of Middlesex, as well as it does that of Devonshire, or exempt our *laurel hedges* from the danger of being cut down by severe frosts, it would be an acquisition of no small consequence to the pleasure of the gentleman, as well as the profit of the gardener.

The settlement made at *New Holland* gives a large scope to these experiments; many plants have been brought from thence which endure our climate with little protection; and some of these arrive at puberty at an early period; we have already three from the south point of Van Dieman's Island, where the climate cannot be wholly without frost; *Mimosa verticillata*, *Eucalyptus hirsuta*, and *Obliqua*. The first of these appears to have produced flowers within eight years of its first introduction; but as a settlement is now made very near the spot where the seeds of these shrubs will be collected, we may reasonably hope to receive further supplies, and extend our knowledge on this curious and interesting subject.*

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* Vide Transactions of the Horticultural Society, Vol. I.

The *Apricot*, we are informed, came originally from *Armenia*, whence it takes its scientific appellation PRUNUS ARMENIACA, formerly called MALUS ARMENIACA, and was cultivated in this country first in 1562, or, according to others, in 1582, being procured from *Italy* by a gardener of Henry VIII.

The *Plum* (PRUNUS DOMESTICA), although wild in our hedges, bears but an unkindly fruit, but of the eatable kind, is generally supposed to be a native of *Asia*, and the *Damascene*, *Damson* (PRUNUS DAMASENUS) takes its name from *Damascus*, a city of *Syria*. According to *Pliny*, it came from *Syria* into *Greece*, and thence into *Italy*.

The *Peach* (AMYGDALUS PERSICA) called by the Romans MALUS PERSICA, is a native of *Persia*, and was introduced from thence into Europe, and now flourishes equally well here as in *Persia*.

The *Nectarine*, a variety of the peach, called so from *Nectar*, the drink of the gods, from the rich, racy, nectareous flavour of the fruit, was introduced into England in 1562.

Cherries (CERASUS) came originally from a city of *Pontus*, named *Cerasus*, into *Italy*, from which place LUCULLUS brought them, carrying them on his triumphal car, after the Mithridatic war. They extended wherever the Roman arms reached, and were introduced into Great Britain Ann. Dom. 55. In an old record we have an account of our ancestors selling them in the streets on their branches. The wild cherry is, however, found in Yorkshire and Westmoreland.

The *Vine* (VITIS) is a native of the temperate climates, and has been cultivated ever since the flood. It is well known in this country. It is a curious fact, that this plant delights in particular spots. Colonel Patterson says, that the grape which produces the famous Constantia wine, so called from Constantia, a town near the Cape of Good Hope, when transplanted within a mile of the same spot produces a very inferior wine. The Domesday Book mentions at Ragenia in Essex one parke and six arpennies of vineyard, which if it takes well, yields twenty modii of wine. The Hon. Charles Hamilton made the experiment of a vineyard at Pain's Hall. He planted the south side of a hill, the soil a gravelly sand, with two sorts of Burgundy grapes, the Auvernat and Black Cluster. The *first* year, the plants not being accustomed to the climate, produced an extremely harsh bad wine; the *second* year it became improved; and on the *third* year was as good as the best Champaigne; afterwards rose superior to it. He sold it to wine merchants for fifty guineas a hogshead, and might have had more.

One of the wine merchants, who purchased above six hundred pounds worth, sold the wine at ten and sixpence the bottle, so greatly was it prized.

So much for the production of wine in England; and let it be ever remembered, that history tells us, that the country of *France*, now so like a real *Paradise*, from the cultivation of its vines, figs, and olives, was once so barren and unproductive, that its inhabitants were resolved on emigration,* when some of the wiser part proposed the conquest of *Italy*, which they invaded, and carried back their vines, transporting them to *Gallia*, where they have been so successfully cultivated, as to exceed in generous wines not only Italy and Greece, but all Europe and Asia beside.

We cannot have a stronger proof how foreign plants assimilate to our soil and climate, than in the success of the *Potatoe*, now so generally cultivated in Europe; a plant which was actually pointed out, in the 16th century, as a curiosity in our gardens. *Gerard*, in 1597, informs us, that he received roots of it from Virginia, and it grew and prospered in his garden as in his own native country. He calls it the *American Potatoe*, to distinguish it from the *Spanish Potatoe* (Convolvulus Batatas), which was then better known, and called so from a corruption of the Spanish *Battalas*.

The *Fig* (Ficus), a native of Asia, has been cultivated in England ever since the year 1562. The oldest fig-tree standing in England may be seen in the garden at the archbishop's palace at Lambeth. It still bears delicious fruit. It extends over a surface of fifty feet in height, and forty in breadth. It was planted by Cardinal Pole in the time of Henry VIII. In the garden of the Regius Professor of Hebrew at Oxford is a fig-tree brought from the East, and planted by Dr. Pocock in 1648, which is still flourishing and productive.

The *Pear* (Pyrus Communis), in its wild state, is thorny. Chaucer mentions the pear as common, even in his time, in England.

The *Apple* (Pyrus Malus), in its savage state, is also armed with thorns, and produces the well-known sour fruit called the *Crab*. It was from the enterprize of one *Harris*, a fruiterer to Henry VIII. that, says Evelyn, the environs, thirty miles round London, are planted with fruit from *Flanders*, to the great benefit of the metropolis. It was Lord

* This account may be seen in Evelyn, Vol. II. p. 62.

Scudamore, ambassador to the court of France in the reign of Charles I. who, having collected in *Normandy* scions of cyder apple-trees, when he returned to England, introduced them into the county of Hereford, which is now become one entire orchard.

The *Siberian Crab* is now common with us, and its name denotes its origin.

The *Quince* (Pyrus Cydonia) has its scientific appellation from *Cydon*, a town of *Crete*, famous for this fruit.

The *Mulberry** (Morus) is a native of *Persia*, whence it was introduced into the southern parts of Europe, and is now commonly cultivated in Italy, France, Germany, and England, where the winters are not too severe. Gerard, who published his History of Plants in 1597, speaks of the Mulberry as then common in the gardens of England.

The *Almond* (Amygdalus Communis) comes from *Italy*, or the *South of France*. It is a native of *Barbary*. The Romans obtained the fruit from *Greece*, for the *nuts* are called *Nuces Græcæ*. How beautifully with us does this tree, cultivated for ornament, display its delicate red flowers in the month of March, when few other trees have any leaves, and present one of the most elegant objects of nature.

The *Barcelona Nut* is scarce, and far superior to our *Common Hazel Nut*, and well worth cultivating in England. Its name shews whence it is derived. The *eating nut*, or *round filbert*, was originally from *Pontus*, for the Romans call it, *Nux Pontica*.

The *Chesnut* (Castanea) is a native of the south of Europe, and is said to take its name from *Castanea*, a city of *Thessaly*, where anciently it grew in great perfection. The *Spanish* Chesnut and Dwarf *Virginian* points out, by their names, the origin with us of these trees.

Gerard says, that in his time there were several woods of chesnuts in England, particularly one near Feversham in Kent; and Fitz-Stephens, in a description of London written by him in Henry the Second's time, speaks of a very noble forest which grew on the north part of it. This tree grows sometimes to an amazing size. Not to mention those abroad, there is one at Lord Ducie's at Tortworth, in the county of Gloucester, which measures

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* The *Mulberry* may be noticed as breeding no one insect, neither when growing, or cut down, being deſtined as the food of the *Silkworm* alone. Excellent silk has been produced in England.

nineteen yards in circumference, and is mentioned by Sir Robert Atkyns, in his History of that county, as a famous tree in King John's time; and by Mr. Evelyn, in his Sylva, Book III. Chap VII. p. 232, 4th edition, to have been so remarkable for its magnitude in the reign of King Stephen, as then to be called the Great Chesnut of Tortworth; from which it may reasonably be supposed to have been standing before the Conquest.

The *Triple-thorned Acacia* (Gleditsia Spinosa), from *Virginia*, is now seen adorning every lawn and garden, displaying its elegant shaped leaves, cut out as with a pair of scissars, the leaflets being so regularly formed and disposed, taking their exact hours of sleep, and its flowers scenting a whole garden, afterwards terminating in pods of an astonishing length. It was cultivated in England in 1700.

The *Cork-tree* (Ilex Suber) is seen very flourishing in the Physic Gardens at Chelsea, where is also the *Cedar of Lebanon* (Pinus Cedrus), which adapts itself admirably well to our climate.

Nor does the *Oriental Plane Tree* (Platanus Orientalis), or *Occidental Plane* (Platanus Occidentalis), succeed less with us. The former is the tree that *Xerxes*, when he first beheld it, in his march with 1,700,000 men to invade Greece, was so enchanted with the sight, that he had it adorned with the riches of the East, halted at the spot to admire it, and, as historians report, neglected for several days the object of this extraordinary armament. Wherever the ancients built their sumptuous and magnificent colleges for the exercise of youth in gymnastics, as riding, wrestling, leaping, throwing the disk, &c. and where the philosophers used to meet to converse together, or instruct their disciples, they planted the walks with the Oriental Plane to repress and shade the Palestræ, as is described by Vetruvius, Lib.V. Chap. XI. These trees the Romans first brought from the Levant, and cultivated with so much industry, that Cicero is said to have left the bar, at certain times, to enjoy its shade, and to have increased its growth by feeding its roots with wine, which greatly improves this tree. And so prized was it when first brought to France, that a penny was paid for a seat under its shade. No tree, says Evelyn, will better flourish and abide with us, only requiring frequent and plentiful water, which from their youth they excessively delight in, and gratefully acknowledge by their growth according; so that I am persuaded, that they might be cultivated to the incredible ornament of avenues and parks. The introduction of the Plane

into England was due to the great Lord Chancellor Bacon, who planted those still flourishing at Verulam.*

We can trace, nearly, the introduction of almost every useful plant into Great Britain. To proceed. Of the *Hop* (HUMULUS LUPULUS). The young shoots of this plant are eaten in the spring as asparagus. It is used by the dyer to dye wool yellow: from the stalks a strong cloth may be made; but its chief use is to bitter, by its strobile, beer, so that it may keep, and taste more pleasant. This plant was first cultivated here in 1524, the 15th year of Henry VIII. It prospered exceedingly; and we find a book soon after in black letter recommending its culture. The author, Reynolde Scott, complains, in his "*Perfite Platforme of a Hoppe Garden*," that "the Flemmings envy our practice herein, who altogither tende their own profite, seeking to impownde us in ignorance, to cramme us with the wares and fruits of their countrie, and doe anye thing that myght put impediment to our cultivating the hoppe, discommending our soyle and climate, sending us to Flaunders for that which we can finde better at home."

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* At Shadwell Lodge, in the county of Norfolk, the seat of John Buxton, Esq. there may be seen a Plane-tree, which is remarkable for its speedy growth. When planted in April 1744, it was eight feet high, and when measured in April 1755, the following were its dimensions:

	Feet.	Inches.
Height	63	9
Circumference at half a foot from the ground	7	9
At five feet	5	6
At ten feet	5	0
At sixteen feet	4	8½
At twenty feet	4	6

The oriental Plane-tree was greatly respected by the ancients for its cooling shade:

Jamque ministrantem *Platanum* potantibus umbram. VIRG.

And so great was their veneration for it, that in the height of their enthusiasm they used to refresh its roots with wine instead of water. Tantumque postea honoris increvit, ut mero infuso enutriantur: compertum id maxime prodecesse radicibus; docuimusque etiam arbores vina potare. PLIN.

In the ACADEMIA, or School of Plato, the philosophers used to walk and converse together under the shade formed by these delightful trees; to which custom Horace alludes:

Atque inter Silvas Academi quærere verum. Lib. ii. 2.

Pliny informs us that this tree was first brought over the Ionian Sea into the island of Diomedes, for a monument to that hero: thence it passed into Sicily, and so into Italy, where it has continued ever since to give coolness and refreshment to the inhabitants in the height of summer.

Not long after the introduction of this useful plant, the city of London petitioned parliament against two "anusancies," and these were Newcastle coals and hops; the latter, as it would spoil the taste of drink, and endanger the peoples' health. And in Queen Elizabeth's time there is an edict against the use of that "*pernicious weed*" the Hop, whose culture now employs thousands, and brings a great revenue to the state.

The *Flax* (LINUM USATISSIMUM) is supposed to be originally from those parts of Egypt* which are exposed to the inundations of the Nile. Upon record we have (Exodus, chap. ix. ver. 31), flax mentioned as a plant cultivated in that country; for which reason antiquaries have been surprised to find the vestment of the mummies made of cotton. It need not be told the reader that the fibres of this plant are manufactured into linen, and this linen, when worn out into rags, produces paper, which must be contemplated, with the art of printing, as an amazing discovery. Its seeds are the linseed, whose oil is made into cakes for the fattening of cattle, and as a manure for the earth.

Most of the flax cultivated in Ireland is from seed imported from *America*. But for heavy or clay lands they sow Riga, Dutch, or Flanders seed. This is an annual, and produces the finest linen. But the *Siberian Flax* has been tried, which is perennial, and it answers very well for making common strong linen, but the thread is not so fine or white as that which is produced from the common. But as the roots of this will continue many years, it will require little other culture but to keep it clean of weeds, which cannot well be done, unless the seeds be sown in drills, that the ground may be constantly kept hoed to destroy the seeds. This sort must have the stalks cut off close to the ground when ripe, and then managed in the same way as the common sort.

Mr. Miller mentions, in his Dictionary, another kind, which he names *Linum bienne*. He received it from *Istria*, and says it produced the finest thread of all the sorts which he tried. It grows taller than the common flax, and in gardens lives through the winter without receiving the least injury from frost. Mr. Miller gave a parcel of the stalks of this, with the *Spanish* and *Siberian* perennial sorts, to a person well skilled in watering,

* The Egyptians make an useful coarse cloth of the *Common Nettle* (URTICA), and pray for an abundant harvest of Nettles. With us the *Nettle* is, with the *Thistle*, the chief food of the *Ass*, the horse refusing to eat either.

breaking and dressing flax, who having prepared them, assured him, that the Istrian flax, cultivated in this country, was by much the finest of the three, and was in goodness preferable to any he had seen.

Hemp (CANNABIS) may be traced from the East. The eastern name of this plant is *Cannab*. Linnæus, in his Materia Medica, gives it to the *East Indies* and *Japan*. Thunberg says it grows here and there in *Japan*. Gmelin thinks it may be a native of *Tartary*, since it is found there, though the Tartars do not cultivate it. In the Species Plantarum it is said to grow wild in *India*; but in Reichard's edition of the Systema it is assigned to *Persia*. Father Hennepin found it wild among the Illinois in *America*.

The uses of Hemp are well known, as well as its great importance for sails and cordage. Exceeding good huckaback is made from it for towels and common tablecloths. The low-priced hempen cloths are a general wear for husbandmen, servants, and labouring manufacturers. They possess this advantage over Irish and other linens, that their colour improves in wearing, whilst theirs declines. *English Hemp*, properly manufactured, stands *unrivalled* in its strength, and is superior, in this respect, to the *Russian*. Considerable quantities of cloth are imported from that country for sheeting, merely on account of its strength, for it is coarser at the price than other linen. *Our hempen cloth*, however, is preferable, being strengthened from the superior quality of the thread, and at the same time whiter in washing.

The Hemp raised in *England* is not of so spongy a nature as that we have from *Russia*, and therefore it requires a smaller proportion of tar to manufacture it into cordage. Tar being cheaper than hemp, some rope-makers prefer foreign hemp to ours, because they can make a greater profit in working it. But cordage must certainly be stronger in proportion as there is more hemp or less tar in it, provided there be a sufficient quantity of the latter to unite the fibres. An oil is extracted from the seed.

Tea (THEA) is thought by some capable of being naturalized to our climate. It is generally believed, although there are many varieties, that the tea is but of one species, and that the differences are the production of soil, climate, and a particular mode of preparation. The two obvious distinctions of *green* and *black teas* naturally suggested the idea, that there were two distinct species of this plant; and I believe it was Sir John Hill who first attempted at the distinction, remarking that the *Green Tea* (THEA VIRIDIS) had *six* petals, whereas the *Black Tea* (THEA BOHEA) has *nine*;

and it must be allowed, that the two plants differ greatly in the formation of the leaves, obvious even to the most inattentive observer. The *green* tea plant has leaves of a larger size than the other, elliptic, sharp-pointed; whereas the black is a perfect oval, rounder at the apex, and of an apple-green colour, whereas the black is of a dark olive; the *former* has a very wrinkled leaf, the *latter* perfectly smooth: the textures also differ; the *green* has a much looser texture, hence the one is somewhat transparent, the other opake; the *green* spreads out, waving like the leaves of corn, and distant, whereas the *black* are numerous, stiff, and pressed close to the stem: the edges also differ; the *green* is unequally toothed, teeth large, it may be said to be jagged; the *black* is simply serrated, the teeth even, and minute. No two plants, therefore, can be more readily discriminated than the *black* and *green*, although the fructification so greatly resembles in both that these are usually not to be distinguished; for the number of petals in both kinds is very subject to vary. The leaf of the bohea tea, by the firmness of its texture, approaches very near to the *Japan Rose* (CAMELLIA JAPONICA), only these are half the size; and it seems closely allied to this plant, so that gardeners also notice this resemblance; and it is curious, that the early plants imported to Europe, as the true tree, sold by the Chinese, were actually the CAMELLIA JAPONICA;* and I think it more than probable, that the leaves of this plant are used with the green tea, which *may* render that kind of tea so stimulating; and it is allowed on all hands, that this plant is intermixed with the green tea, and may produce much pernicious effect upon some peculiar habits. But I mention this only as my own imperfect conjecture; for, swayed by the general, and now universally received, opinion,† I am not indeed allowed to consider the *black and green tea* (THEA NIGRA ET VIRIDIS) as forming distinct teas of themselves.

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* Linnæus endeavoured, for several years, to procure the *Tea* tree for the Botanic Garden at Upsal, but by a variety of accidents they were all destroyed on the passage. At length, in the year 1765, Lagerstroem, a director of the Swedish East India Company, brought him two plants, which he himself obtained in China; but they proved to be the Camellia, the crafty Chinese, says Professor Martyn, having plucked away the flowers. In 1769 Linnæus received another plant from France; but that also proved to be the Camellia, which is now common enough in our green-houses, as being a very ornamental plant. But in October 1763 Linnæus first received the true tea-plant from Gustavus Ekeberg, captain of a Swedish Indiaman, who raised it from seed on the voyage. The first that flowered in England was at Sion, the seat of the Duke of Northumberland.—MARTYN.

† Professor Martyn, Dr. Lettsom, Des Fontaine, &c. with all the travellers into China, are agreed, that there is no just distinction into the two species here attempted to be formed; yet, if any one will take the pains to examine the *greens* and *black* teas imported, the distinctions of the leaves

The following is the description usually given of the *Tea-tree*, without attending much to the two kinds discriminated by Linnæus.

Tea is a branchy evergreen shrub, which, according to Kempfer and Thunberg, grows to the height of four or five feet, though other travellers assert that it rises sometimes to thirty.

Its *leaves* are alternate, hard, oval, or elliptic; of a somewhat shining green colour, entire near the base, but serrated in the rest of their length, and supported on a short and half-cylindric foot-stalk. The buds are acute, and accompanied with a husk, which detaches itself, and drops off at the period of its developement.

The *flowers* grow singly, or sometimes, but more rarely two-and-two, in the eyes of the leaves, on short and somewhat thick pedicles.

The *calyx* is small, persistent, and has five obtuse divisions.

The *corolla*, for the most part, has six white petals, round and open: the two exterior ones are smaller and unequal. Its breadth is about the third of an inch.

The *stamina*, which are more than two hundred in number, are shorter than the corolla, and attached under the germen. Each anther has two cells.

The *germen*, which is of a rounded triangular form, and surmounted by a style divided into three filiform stigmata, becomes a *capsule* with three round monospermous cells united at the base, and opening longitudinally on one side only.

The *seeds* are spherical, internally angular, of a rather large size, covered with a thin shining pellicle, a little hard, and of a maroon colour. The kernel is oily, and of a bitter and disagreeable taste, which produces salivation, and even occasions nausea.

It is cultivated every where, from Canton to Pekin; where the winter, according to the observations of the missionaries, is more severe than at Paris. It would, no doubt, be possible, says the learned Des Fontaines, to

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of the two kinds here given may be noticed, and the *greater thinness* and *length*, &c. of the *green leaf* will be readily observed. It is said, that the *Green Tea* being once in fashion in England, the East India Company wished to have chiefly this sort, and it was returned in answer by the Chinese, "that to extirpate their *Bohea Tea-trees*, and plant in their room *Green Tea-trees*, would take up several years to accomplish, nor had they, at that time, *Green Tea* enough to supply our market." Hence persons were engaged to write down the *Green Tea*, and turn the tide of public opinion in favour of the *Black Tea*, which is now almost universally drank in England, or mixed with only a sprinkling of green.

A. Cunning
Thea Viridis or Green Tea
Warner sculp

propagate this valuable plant in France, if one could procure a sufficient number of individuals to make experiments, by cultivating it in different soils and under different climates. This object deserves the attention of government, as the consumption of tea is immense, and as the quantity imported every year amounts to a considerable sum, for which Europe is rendered tributary to China. The tea seeds brought to us from that country become rancid, and spoil at sea; so that scarcely one of a thousand produces plants. It would, therefore, be necessary that persons who go to China should procure them exceedingly fresh, and take care to sow them, before they sail, in boxes filled with light earth: they would then spring up on the passage. Nothing would be necessary but to water them from time to time, and to preserve them from the sea water: the young plants might then arrive in safety.

These are the chief distinctions of teas in Europe:

GREEN TEAS.

1. *Bing*, so called from the man who first made that tea, *Imperial* or *Bloom Tea*, with a large loose leaf, of a light green colour, and a faint delicate smell. The leaves are not rolled.*

2. *Hy-tiam, hikiong, hayssuen* or *hee-chun*. Known to us by the name of *Hyson Tea*,† named from an Indian merchant, who first sold tea to an European, his tea being asked for ever after. The leaves are closely curled and small, of a green colour verging towards blue.—Another *Hyson Tea*, with narrow short leaves, is called *Hyson-utchin*. There is also a Green Tea named *Gobé*, with long narrow leaves, strongly rolled.

3. *Song-lo* or *Singlo*, which name it receives, like several others, from the place where it is cultivated.‡

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* The *Bing* grows four days journey from the hyson country. The leaves are long and thin, those of *Singlo* short and thick.—Asiatic Researches.

† Of *Hyson* there are two gatherings, and each gathering is distinguished into two or more sorts; but as great care is taken in gathering it, 60 catties (a catty is 21 ounces and a third, or three catties is four pounds) from one pecul, when only 45 catties can be chosen from the *Singlo*.

Hyson-skin, as it is called, has its name from being compared to the skin or peel to the *Hyson* tea, a sort of cover to it, and consequently not so good. It consists of the largest leaves, flat, unhandsome, bad coloured. This is called in London *bloom tea*.

Gobe, Gomi, and Ootseen, are also leaves picked from the *Hyson* leaves. Those called *Gomi* are small, and very much twisted, so that they appear like bits of wire. The *Ootsieu* are more like little balls.—Asiatic Researches.

‡ *Tunkey Singlo* tea is the best, which is owing to the soil: it grows near the *Hyson* country.

BOHEA TEAS.

1. *Soo-chuen, sut-chong, sou-chong,* or *su-chong,* called by the Chinese *saa-tyang,* and *sact-chaon* or *sy-tyann,* is a superior kind of *Cong-fou Tea.* It imparts a yellowish green colour by infusion; and has its name from a place or province in China.*

Padre-Souchong, called so because the priests drink it, has a finer taste and smell. The leaves are large and yellowish, not rolled up, and packed in papers of half a pound each. It is generally conveyed by caravans into Russia. Without much care it will be injured at sea. It is rarely to be met with in England.

2. *Cam-ho* or *Soum-lo,* called after the name of the place where it is gathered. A fragrant tea, with a violet smell. Its infusion is pale.

3. *Congo-fou, congo* or *bongo-fo.* This has a larger leaf than the following, and the infusion is a little deeper coloured. It resembles the common Bohea in the colour of the leaf.†

Ordinary *singlo tea* is neither so often tatched (tatching is drying in a flat iron pan heated), or picked, as the above.

Singlo and hyson teas are cured in the following manner: when the leaves are gathered, they are directly tatched, and then very much rubbed by men's hands to roll them, after which they are spread to divide them, for the leaves in rolling are apt to stick together; they are then tatched very dry, and afterwards spread on tables to be picked; this is done by girls or women, who, according to their skill, can pick from one to four catties each day. Then they are tatched again, and afterwards again, and after that tossed in flat baskets to clear them from dust; they are then again spread on tables and picked, and then tatched for a fourth time, and laid in parcels, which parcels are again tatched by ten catties at a time, and when done put hot into baskets for the purpose, where they are kept till it suits the owner to pack them in chests or tubs, before which the tea is again tatched, and then put hot into the chests or tubs, and pressed in them by hand. When the tea is hot it does not break, which it is apt to do when it is cold. *Singlo* tea being more dusty than *Hyson* tea, it is twice tossed in baskets, hyson only once.

It appears that it is necessary to tatch these teas whenever they contract any moisture; so that if the seller is obliged to keep his tea any time, especially in damp weather, he must tatch it to give it a crispness before he can sell it.

It is to be observed, that the quantity of leaves tatched increases with the times of tatching; at first only half or three quarters of a catty of leaves are put into the tatches.—Asiatic Researches.

* Souchong is made from the leaves of trees three years old, and where the soil is very good; of older, when not so good, congo is made. The leaves of older trees make bohea. The tea-trees last many years. When tea-trees grow old and die, that is, when the bodies of the trees fail, the roots produce new sprouts, which make Peko.—Asiatic Researches.

† *Congo,* says *Chow-qua,* a Chinese, is tatched twice, as is *Souchong*; but *Youngshaw* says *Souchong* and *Congo* are not tatched, but only fired two or three times. The latter is most probable, but yet the former may be true; for as tatching seems to give the green colour to the leaves of the tea trees, so we may observe something of that greenness in the leaves of congo and souchong teas. *Youngshaw* further says, that the leaves of *Souchong, Congo, Hyson,* and fine *Singlo* trees are beat with flat sticks or bamboos, after they have been withered by the sun or air, and have acquired toughness enough to keep them from breaking, to force out of them a raw or harsh smell.—Asiatic Researches.

There is a sort called *lin-kisam*, with narrow rough leaves. It is seldom used alone, but mixed with other kinds: by adding it to *Congo*, the Chinese sometimes make a kind of *Pekoe* Tea.*

4. *Pekao*, *pecko* or *pekoe*, by the Chinese called *back-ho* or *pack-ho*. It is known by having the appearance of small white flowers intermixed with it.†

5. Common *Bohea*, or *Black Tea*, called *moji* or *mo-ee* by the Chinese, consists of leaves of one colour, a brownish green.‡ The best is named *tao-kyonn*. An inferior kind is called *An-kai*, from a place of that name.

Besides these, Tea, both Bohea and Green, is sometimes imported in balls, from two ounces to the size of a nutmeg and of peas. The Chinese

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* *Lintsessin* seems to be made from very young leaves rolled up, and stalks of the tree; the leaves are gathered before they are full blown. This tea is never tatched, but only fired. Were the leaves suffered to remain on the trees until they were blown, they might be cured as peko, if longer, as congo and bohea. This tea is in no esteem with the Chinese; it is only cured to please the sight; the leaves are gathered too young to have any flavour.—Asiatic Researches.

† *Peko*, a tea which we import for Sweden and Denmark, is made from the leaves of trees three years old, and from the tenderest of them, gathered just after they have been in bloom, when the small leaves that grow between the two first that have appeared, and which altogether make a sprig, are downy and white, and resemble young hair or down. Trees of four, five, and six years old may still make peko; but after that they degenerate into bohea if they grow on the plains, and into congo if they grow on the hills.—Asiatic Researches.

‡ *Chow-qua* says, that *Bohea* may be cured as *Hyson*, and *Hyson* as *Bohea*, and so of all other sorts; but that experience has shown, the teas are best cured as suits the qualities they have from the soils where they grow; so that bohea will make bad hyson, and hyson, though very dear in the country where it grows, bad bohea. However, in the province of *Tokyen*, which is called the *Bohea* province, there has since a few years some tea been made after the *Hyson* manner, which has been sold at *Canton* as such.

The *Bohea* country, in the province of *Tokyen*, is very *hilly*, and since some years greatly enlarged; the length of it is four or five days' journey, or as much again as it formerly was. The extent of the soil that produces the best bohea tea is not more than 40 li, or about 12 miles; in circumference it is from 100 to 120 li. Not only the hills in this country are planted with tea trees, but the valleys also; the hills, however, are reckoned to produce the best tea; on them grow *Congo*, *Peko*, and *Souchong*, in the *valleys* or flat parts of the country *Bohea*. As to the true *Souchong*, the whole place does not yield three peculs; *Youngshaw* says, not more than three catties. The value of it on the spot is 1£ or two tales the catty, about ten or twelve shillings the pound. What is sold to Europeans for *Souchong* is only the first sort of *Congo*, and the *Congo* they buy is only the first sort of *Bohea*. Upon a hill planted with tea trees, one only shall produce leaves good enough to be called *Souchong*, and of those only the best and youngest are taken; the others make *Congo* of the several sorts, and *Bohea*.

There are four or five gatherings of *Bohea* tea in a year, according to the demand there is for it, but *three*, or at most *four* gatherings are reckoned proper; the others only hurt the next year's crop. Of *Souchong* there can be but *one* gathering, viz. of the first and youngest leaves; all others make inferior tea.

The first gathering is called *tow-tchuue*, the second *eurl*, or *gee-tchuue*, the third *san-tchuue*. If the first leaves are not gathered, they grow large and rank, and are not supplied by the second leaves, which only come in their room or place, and so on.

call it *Poncul-tcha*. The smallest in this form is well known under the name of *Gunpowder Tea*.*

The first gathering is reckoned fat or oily, the second less so, the third hardly at all so, yet the leaves look young. The first gathering is from about the middle of *April* to the end of *May*; the second from about the middle of *June* to the middle of *July*; the third from about the beginning of *August* to the latter end of *September*. Tea is never gathered in winter. The first gathering or leaf, when brought to Canton, commonly stands the merchants in

	11¼	tales (a tale is 6 shillings and 8 pence) the pecul.
the 2d	11	or less.
the 3d	9	——

The method of curing Bohea tea of these three growths is, according to *Chow-qua*, thus:

When the leaves are gathered, they are put into large flat baskets to dry, and these are put on shelves or planks, in the air or wind, or in the sun, if not too intense, from morning until noon, at which time the leaves begin to throw out a smell; then they are tatched. This is done by throwing each time about half a catty of leaves into the tatche, and stirring them quick with the hand twice, the tatche being very hot, and then taking them out with a small short broom, if the hand is not sufficient. When taken out, the leaves are again put into the large flat baskets, and there rubbed by men's hands to roll them; after which they are tatched in larger quantities, and over a cooler or slower fire, and then put into baskets over a charcoal fire, as is practised on some occasions at Canton. When the tea is fired enough, which a person of skill directs, it is spread on a table, and picked and separated from the too large leaves, yellow leaves, unrolled, broken, or bad leaves.

Youngshaw says, Bohea tea is gathered, sunned in baskets, rolled with the hand, and then tatched, which completes it.

Another says it is gathered, then put in sieves or baskets, about a catty in each, and these are put in the air till the leaves wither or give, after which they are put into a close place out of the air, to prevent their growing red, until the evening, or for some hours; the smell then comes out of them. They are after this tatched a little, then rolled, and then tatched again; and about half a catty is tatched at one time.—Asiatic Researches.

* There are also other teas.

Ho-ping tea is so called from the country where it grows, which is twelve easy days journey from Canton. This tea is cured after the manner of bohea, only in a more careless or slovenly way, on account of its little value, and with wood instead of charcoal fire, which is not so proper, and adds to the naturally bad smell the tea has from the soil where it grows.

Leoo-ching (or *Lootsia*), the name of a place eight days journey from Canton: it may produce about 1000 peculs of tea in a year. This tea is cured as bohea, or as green, as the market requires, but is most commonly made to imitate singlo, which suits it best.

Honan tea grows opposite to Canton; it is cured in April or May for the Canton market, that is, for the use of the inhabitants of Canton, especially the women, and not for foreigners. There is but little of it, about 200 peculs. The worst sort of it remains flat, and looks yellow: it is tatched once to dry it, but not rolled, and is worth three candarines the catty. The best sort is tatched once, and rolled with the hand, and tatched again; it is worth twelve candarines the catty. These teas are not, like the bohea, after they are tatched, put over a charcoal fire. The water of Honan tea is reddish.

Ankoy tea is so called from the country that produces it, which is about twenty-four days journey from Canton. When gathered the leaves are put into flat baskets to dry like the bohea; they are then tatched, and afterwards rubbed with hands and feet to roll them, then put in the sun to dry, and sold for three or four candarines the catty. If this tea is intended for Europeans, it is packed in large baskets, like bohea baskets, and those are heated by a charcoal fire in a hot-house, as is often practised in Canton. Bohea tea is sometimes sent to Ankoy, to be there mixed with that country tea, and then forwarded to Canton.

The worst sort of Ankoy is not tatched; but *Ankoy congo*, as it is called, is cured with care.

The manner of gathering and preparing the leaves, as practised in *Japan*, is fully described by *Kempfer*, an author on whom we may safely depend; and as far as our information reaches, his account is in great measure the method used by the Chinese.

The leaves are gathered carefully one by one, and each person is able thus to collect from four to ten or fifteen pounds in one day. The *first* gathering commences about the end of our February or beginning of March, when the leaves are young and tender: they are called *Ficki Tsjaa*, or powdered Tea, because they are pulverised and sipped in hot water: they are disposed of to princes and rich people only; and hence this kind is called *Imperial Tea*.

A similar sort is called *Udsi Tsjaa*, and *Tacke Sacki Tsjaa*, from the place where it grows. Peculiar care and nicety are observed in gathering these leaves.

The *second* collection is made at the end of March or beginning of April. This is called *Tootsjaa*, or Chinese Tea, because it is infused and drunk after the Chinese manner.

The *third* gathering is made in June, when the leaves are full grown. This is called *Ban Tsjaa*; it is the coarsest, and is chiefly consumed by the lower class of people. By sorting these, several other varieties are produced.

The most esteemed tea of Japan, according to Kempfer, grows in the environs of the small town of *Udsi*, situated in the neighbourhood of the sea. In that district is a celebrated mountain, which is entirely employed for the cultivation of that used by the emperor. This mountain, which has a beautiful and picturesque appearance, is surrounded by a broad ditch, to prevent men and animals from having any access to it. The plantations are laid out by the line, arranged in a manner exceedingly agreeable to the eye, and the shrubs are washed and cleaned every day. While the leaves are collecting, the men employed in that operation bathe two or three times

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like good bohea or congo: this sort is generally packed in small chests. There is also *Ankoy-peku*; but the smell of all these teas is much inferior to those of the bohea country. However, Ankoy-congo of the first sort is generally dearer at Canton than the inferior growths of bohea.

As tatching the tea makes it sweat, as the Chinese term it, or throw out an oil, the tatche in time becomes dirty, and must be washed.

If bohea is tatched only twice, it will be reckoned slovenly cured, and the water of the tea will not be green, but yellow; so that fine bohea tea must be cured as congo; the coarse is not so much regarded.—Asiatic Researches.

every day, and wear gloves when they pick the leaves, to prevent them from being dirtied. When the leaves have been torrified and properly prepared, they are shut up in vessels of great value, and conveyed with much pomp to the emperor's palace.

The Japanese ascribe to tea a miraculous origin. Darma, a very religious prince, and third son of an Indian king, named Kosjusvo, landed in China, they say, in the year 510 of the Christian era. He employed all his care and thought to diffuse throughout the country a knowledge of God and religion; and, being desirous to excite men by his example, imposed on himself privations and mortifications of every kind; living in the open air, and devoting the days and nights to prayer and contemplation. After several years, however, being worn out with fatigue, he fell asleep against his will; and that he might faithfully observe his oath, which he thought he had violated, he cut off his eye-lids and threw them on the ground. Next day, having returned to the same spot, he found them changed into a shrub which the earth had never before produced. Having eaten some of the leaves of it, he found his spirits exhilarated, and his former vigour restored. He recommended this aliment to his disciples and followers. The reputation of tea increased, and after that time it continued to be generally used. Kempfer, in his *Amœnitates exoticæ*, gives the life with a portrait of this saint, so celebrated in China and Japan. There is seen, at the feet of Darma, a reed, which indicates that he had traversed the seas and rivers.

Whether the *Chinese* collect the tea precisely at the same seasons as in *Japan*, we are not well informed; but most probably the tea harvest is nearly at the same periods, the natives having frequent intercourse, and their commercial concerns with each other being very extensive.

The tea leaves should be dried as soon as possible after they are gathered. For this purpose *public buildings* are erected, containing from five to ten, and even twenty, small *furnaces*, about three feet high, each having at the top a large *iron pan*. There is also a long table covered with mats, on which the leaves are laid, and rolled by women who sit round it. The iron pan being heated to a certain degree by a fire made in the furnace beneath, a few pounds of the leaves are put upon the pan, and frequently turned and shifted by the hands till they become too hot to be endured; they are then thrown upon the mats to be rolled between the palms of the hands; after which they are cooled as speedily as possible. In order that all the moisture of the leaves may be completely dissipated, and their twisted form

be better preserved, the above process is repeated several times with the same leaves, but less heat is employed than at first. The tea thus manufactured is afterwards sorted according to its kind or goodness. Some of the young tender leaves are never rolled, and these are immersed in hot water before they are dried.

After the tea has been kept for some months, it is taken out of the vessels in which it was stored, and dried again over a very gentle fire, that it may be deprived of any humidity which remained, or it might have since contracted.

The common tea is kept in earthen pots with narrow mouths; but the best sort used by the emperor and nobility is put into porcelane or china vessels. The coarsest tea is kept by the country people in straw baskets, made in the shape of barrels, which they place under the roofs of their houses, near the hole that lets out the smoke.*

Thunberg declares, *that the older the leaves are, and the later in the season they are gathered, the greater is the abundance; but then the tea is so much the worse: the smaller leaves, and those which have just shot forth, furnish the finest and most valuable. Young shrubs always yield better tea than old ones; and some places produce it in greater perfection and more delicious than others.*†

According to the accurate account of Sir *George Staunton*, the *largest* and *oldest leaves*, which are the least esteemed, and destined for the use of the lowest classes of the people, are often exposed to sale with little previous manipulation, and still retaining that kind of vegetable taste which is common to most fresh plants, but which vanishes in a little time, whilst the more essential flavour, characteristic of each particular vegetable, remains long without diminution. But the *young leaves* undergo no inconsiderable preparation before they are delivered to the purchaser: every leaf passes through the fingers of a *female*, who rolls it up almost to the form it had assumed before it became expanded in the progress of its growth. It is afterwards placed upon thin plates of earthen ware or iron, made much thinner than is executed by artists out of China. It is confidently said in the country, that no plates of *copper*‡ are ever employed for that purpose.

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* Kempf. amoen. & jap. Thunb. jap. Woodv. Letts. 29—35.

† Travels, Vol. IV. p. 42, 43. Engl. Edit.

‡ This is a prevailing prejudice; and green tea is vulgarly supposed to acquire its colour by means of verdigris, as some pickles have their colour heightened by putting into the vinegar a

Indeed, scarcely any utensil used in China is of that metal, the chief application of which is for coin. The earthen or iron plates are placed over a charcoal fire, which draws all remaining moisture from the leaves, rendering them dry and crisp. The *colour* and *astringency* of *Green Tea* is derived from the *early period* at which the *leaves* are plucked, and which, like *unripe fruit*, are generally *green* and *acrid*. For exportation, the tea, as is well known, is packed in large chests lined with very thin plates of lead; and it is pressed down into these chests by the naked feet of Chinese labourers.*

Chinese drawings, though somewhat rudely executed, exhibit a faithful picture of what they are intended to represent. From a set of these giving the whole process of gathering and manufacturing the tea, we learn that the tree, or rather shrub, grows for the most part in *hilly* countries, often on their rocky summits and steep declivities. Accordingly Sir *George Staunton* informs us, that vast tracts of hilly land are planted with it, particularly in the province of *Fo-chen:* and Chevalier *Thunberg* says, that he met with it frequently in *Japan*, both on the borders of cultivated lands, and upon such mountains and downs as did not well answer the trouble of cultivation. It appears also from these drawings, that the shrubs are not much taller than a man's middle: the gatherers are never represented climbing, they sometimes make use of hooked sticks, but these seem rather intended to draw the branches towards them, when they hang over places difficult of access. They pick the leaves first in a basket, which are soon after gathered into different sorts, and cured by drying them in iron kettles placed upon a range of stoves, like those in a chemist's laboratory, after which the women chiefly work, and curl the leaves one by one. They likewise dry it by spreading it abroad in shallow baskets in the sun; and by means of sieves,

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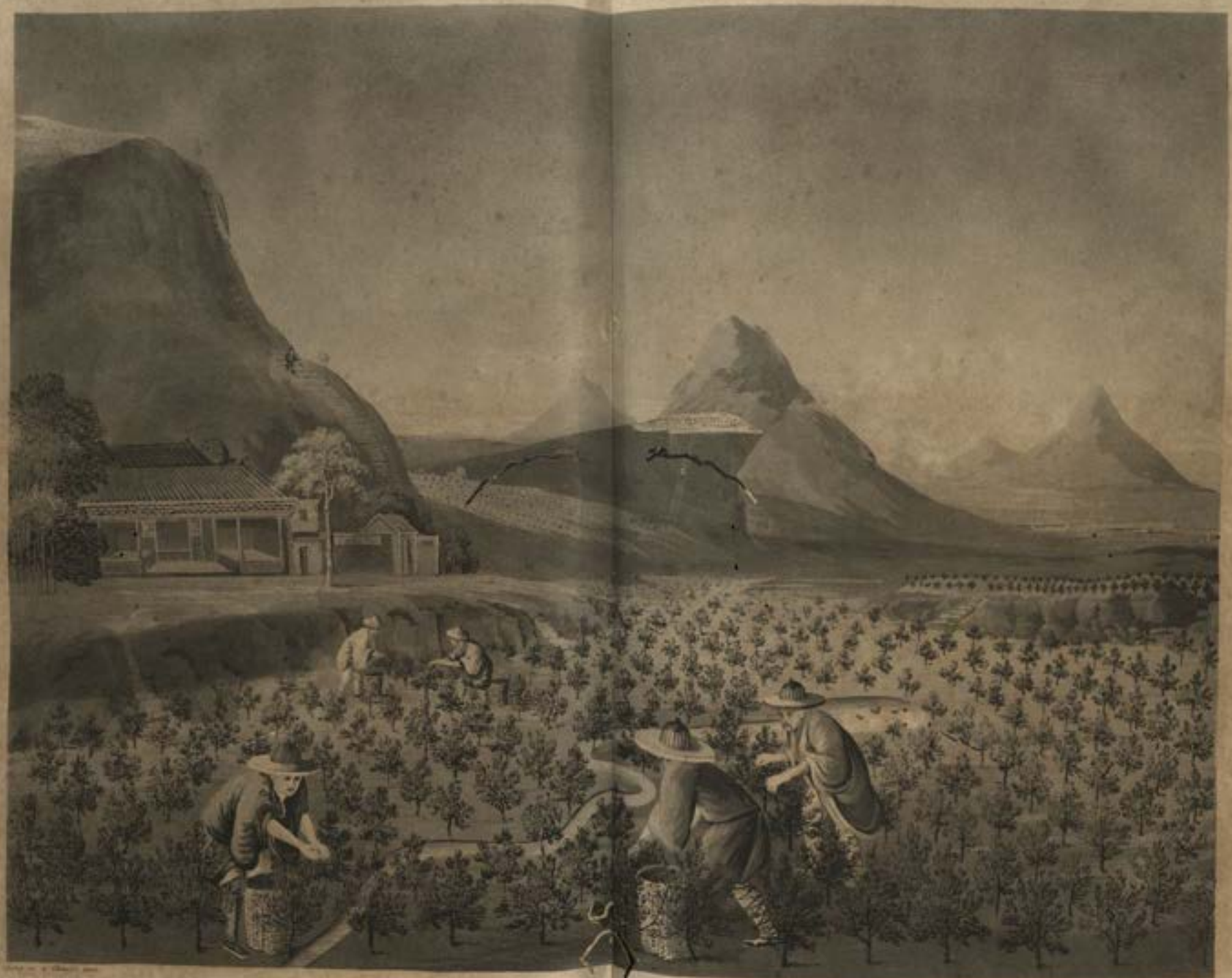
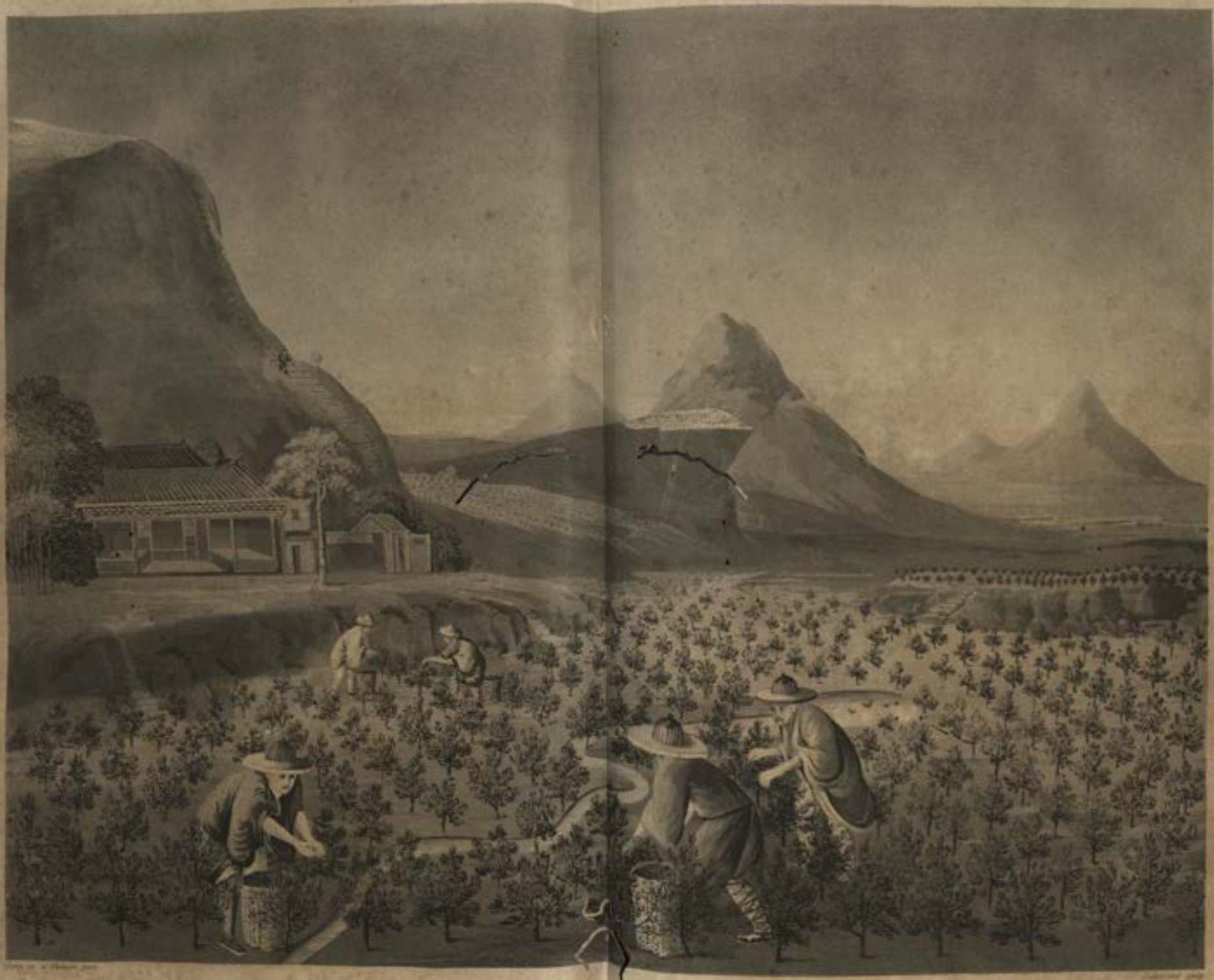
copper halfpenny. But Kempfer positively says, that the tea is torrified on plates of iron. The writer of Lord Macartney's Voyage asserts the same thing: nor could I discover the smallest quantity of copper, which is easily detected by means of chemistry. Pigou, who writes on the Tea tree in the Asiatic Annual Register, says, the Chinese all agree there is but one sort, or species, of the tea tree; and that the difference in tea arises from the soil and manner of curing. As the *malt* is either *brown*, producing our porter, or *pale*, forming our amber-coloured ale, from the manner of drying, so the tea is supposed to be made *brown* by a quick heat, and the *green* is produced by a slack heat, and more careful drying, which in consequence is obliged to be oftener repeated, the *black* teas being dried but twice, and the *green* as often as six or seven times. Some doubts about the two kinds of shrubs, or tea trees, making the distinctions, likewise are detailed in other places of this long article.

* Embassy, Vol. II. page 465. The practice of employing *iron* or *earthen plates* to dry the tea upon is, perhaps, a mistake, as the process is called tatching, and a *tatche* exactly resembles our pitch kettle.



GATHERING OF TEA.



GATHERING OF TEA.

separate the larger from the smaller leaves, and these again from the dust. The tea is then packed up in chests for the market.

The Chinese put the finer kinds of tea into conic vessels, like sugar loaves, made of tutanag, tin, or lead, covering them with a neat packing of bamboo. The common tea is put into baskets, out of which it is emptied, and packed in boxes or chests, as soon as it is sold to the Europeans.*

It is not known what arts are used in China to give a variety of colour and flavour to their teas, which cannot all be satisfactorily accounted for from soil, situation, and the different seasons at which the leaves are gathered. In *Japan* the produce is chiefly consumed within the country; whereas in *China*, the exportation we know is very consideration, and the temptation great to exercise the arts of sophistication, in which it is notorious the Chinese are not deficient.

In the Chinese drawings abovementioned, there are figures of several persons apparently separating the different kinds of tea, and drying it in the sun, with several baskets standing near them filled with a white substance, and in considerable quantity. To what use this may be applied is uncertain, as well as what the substance is; yet there is little doubt that it is used in the manufacturing of tea, because the Chinese do not introduce any thing into their pieces, but what relates in some respect to the subject.

We are better acquainted with a vegetable substance which is employed in giving a flavour to tea. This is the *Olea fragrans*, the flowers of which are frequently to be met with in teas exported from China. The plant itself is now not unfrequent in our stoves.†

The flowers also of the *Camellia Sesanqua* and of the *Arabian Jasmin* are sometimes mixed among the teas, for the same purpose of increasing their fragrance. The Chinese call the former Cha-whaw, or flower of tea. It is cultivated in vast abundance in China, not so much for this purpose, as for its nut, which yields an *esculent oil*, equal to the best which comes from Florence. The Tea plant is particularly valuable from the facility of its culture on the sides and very tops of mountains, in situations fit for little else.‡

We are not certain what motive induced the natives of *China* and *Japan* first to use an infusion of tea; but it is highly probable that it was in order

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* Lettsom, p. 36. † Idem, p. 43. ‡ Staunton Embassy, Vol. II. p. 467.

to correct the water, which is said to be brackish and ill tasted in many parts of those countries.*

Sir *George Staunton* says, that persons of rank in China are so careful about the quality of the water intended for their own consumption, that they seldom drink any without its being distilled; and every Chinese infuses tea or some other vegetable supposed to be salubrious, in the water which he uses. Like beer in England, tea is sold in public houses in every town; also by the side of public roads, and on the banks of rivers and canals, both in *China* and *Japan*; nor is it unusual for the burthened and wearied traveller to lay down his load, refresh himself with a cup of warm tea, and then pursue his journey.†

These qualities, of taking off the ill taste of water, and refreshing after fatigue, have been experienced in other countries besides China and Japan. Thus *Kalm* says, if tea be useful, it must be so in travelling through a desart country, where wine or other liquors cannot conveniently be carried, and where the water is generally unfit for use, as being full of insects. In such cases it is very pleasant when boiled, and *tea* is infused in it; nay, I cannot sufficiently describe the fine taste it has in such circumstances. It relieves a weary traveller more than can be imagined, as I have experienced with many others who have travelled through the forests of America: on such journies *tea* is found to be almost as necessary as victuals. *Forster*, the translator, adds, that on his travels through the desart plains beyond the river Volga, he has had several opportunities of making the same observations on *tea*, and that every traveller in the same circumstances will readily allow them to be very just.‡—Captain *Forrest*, in his voyage to New Guinea, relates several instances, wherein the sailors experienced the exhilarating effects of this infusion.§ Other travellers have borne testimony to this pleasant and salutary effect of *tea*. And persons, after violent exercise, or coming off a journey much fatigued, and affected with a sense of general uneasiness, attended with thirst and great heat, by drinking a few cups of warm *tea*, commonly experience immediate refreshment.

Neither the *Chinese*, nor the natives of *Japan*, ever use *tea*, before it has been *kept at least a year*; because when fresh it is said to prove narcotic,

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* Lettsom, p. 19. † Embassy, Vol. II. p. 69, 66.
§ Travels in North America, Vol. II. p. 304, engl. ed. § Lettsom, p. 20. ‖ Idem. p. 95.

and to disorder the senses. The *Chinese* pour hot water on the tea, and draw off the infusion in the same manner as is now practised in Europe; but they drink it without sugar or milk. The *Japanese* reduce the tea to a fine powder, by grinding the leaves in a hand-mill; the cups are filled with hot water, and as much of this powder as might lie on the point of a moderate sized knife is put into each cup, and stirred about till the liquor foams, and it is sipped while warm. According to Du Halde, this method is also used in some provinces of China.

The common people, who have a coarser tea, boil it for some time in water, and use the liquor for common drink. Early in the morning, the kettle filled with water is hung over the fire, and the tea is either put in inclosed in a bag, or by means of a basket pressed to the bottom of the vessel. The coarsest tea only is used in this manner, the qualities of which being more fixed, would probably not be so fully extracted by infusion.

Tea indeed is the *common beverage* of all the labouring people in *China*; and they are scarcely ever represented at work of any kind, but the tea-pot and tea-cup appear as their accompaniments: reapers, threshers, and all who work out of doors, as well as within, have these attendants.*

With respect to the qualities of tea, it appears that an infusion of *green tea* has the effect of raising the sensibility of the nerves, and the irritability of the muscles: and that it gives out in distillation an odorous water, which is powerfully narcotic.

That the recent plant contains such an odorous narcotic power, we might presume from the necessity which the Chinese find of drying it with much heat before it can be brought into use; and that even after such preparation they must abstain from the use of it for a year or more, that is, till its volatile parts are still farther dissipated: and it is said, that unless they use this precaution, the tea in a more recent state manifestly shows strong narcotic powers. Even in this country the more odorous teas often show their powers in affecting the nerves of the stomach, and indeed of the whole system.

From these considerations it may fairly be concluded, that *tea* is to be considered as a narcotic and active substance; and that it is especially such in its most odorous state, and therefore less in the *bohea* than in the *green tea*, and the most so in the finer kinds of the latter.

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* Lettsom, p. 48.

Its effects however seem to be very different in different persons; and hence the contradictory accounts that are given of them. But if we consider the difference of constitution, which occasions some variation in the operating of the same medicine, and of which we have a remarkable proof in the operation of *opium*, we shall not be surprised at the different operations of *tea*.

It is not at the same time to be denied, that *green tea* may sometimes have good effects. It is very possible, that in certain persons, taken in moderate qualities, it may, like other narcotics, prove exhilarating, or like them, have some effect in taking off irritability, or in quieting some irregularities of the nervous system.

As its bad effects have been often imputed to the warm water that accompanies the tea, so there is no doubt that some of its good effects may also be ascribed to the same cause, and particularly its being so often grateful after a full meal.*

After all, the infusion of tea, as it is commonly taken in England, with a competent quantity of cream or milk and sugar, cannot be very narcotic or sedative, especially as after a long voyage it is kept some time in the East India Company's warehouses; and the finer sorts of it are not so much in request as formerly. Nor can it be an unwholesome beverage for sedentary persons and such as live freely, provided it be not taken too hot, or in immoderate quantities, or without any solid food accompanying it.† For the

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* Cullen, Mat. Med. Vol. II. 809. Woodville, Vol. IV. 120. See Lettsom, p. 59, to the end.

† Anxious to ascertain this point as far as possible (for my Grandmother, Mrs. Winstanley, at the age of near one hundred, was in the habit of taking very strong *Green Tea*, and would not allow any bad effects from tea, often being told it was a *slow* poison, of which *slowness* she was a tolerably good proof), I enquired of a gentleman who is *smeller* and *taster* to the East India Company of the Teas at Canton, from whom I obtained the following information.

My dear Sir, *London, Sept.* 7, 1808.

'I had the pleasure to receive your letter of the 5th instant, and it always will afford me much satisfaction to be of the least service to you. You know the confined state we are in during our stay either at Canton or Macao, and the difficulty there is to obtain any information relating to the manufactures and customs of the Chinese, which we can only get from the Hong merchants, none of whom I believe ever were in the tea country themselves, but derive all their information from their *pursers*, who they annually send there to buy them tea. From what I could collect from *them*, I understand that the tree which produces the Black and Green Tea is of the same species, but is cultivated and manufactured in different provinces. The manner of curing the black differs from that of the green, the former is not fired (or tach'd, as the Chinese call it) so often as the latter, and I am pretty certain that the fine light green or bluish colour we observe in the hyson, and other fine sorts of the green tea, to possess, is not natural, but a given colour, either by Prussian blue, or by some other

TACHING, OR DRYING, OF TEA.

TACHING, OR DRINKING, OF TEA.

lower class of people, who generally live poorly, and procure little animal food, tea conveying little or no nourishment, is a bad succedaneum for beer;

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article introduced among the leaves, at the time it is fired or tached, which is always with the hyson three times, and the common twankays and hysonskins twice, sometimes thrice. The blacks (bohea tea excepted) are also fired twice, besides both kinds, viz. blacks and greens, are a good deal exposed to the sun before and after their undergoing this process. The black teas are produced in the province of Fokein, and about twenty-four days journey from Canton; the greens are cultivated further off, from thirty to thirty-three days journey from Canton; the former I should think about 700 miles distant, and the latter near 1000 from Canton. The Chinese merchants call the former the Bohea Country, and the latter the Hyson Country. I understand the finest sorts of the blacks, viz. the Padra Scudry and Souchong and Pekoe, is produced from those trees that are cultivated on the higher land and hills; the trees that grow on the low grounds do not produce good tea. The first gathering of the leaves, which always comprise the finest tea, is in the month of April, or early in May; the second in June, or the beginning of July; and the third, which is the last gathering, is in August or the beginning of September. The curing of the green tea is a more expensive and longer process than the black, and it is always much later in the season before we get them at Canton than we do the black teas. The quantity fired at one time does not exceed two catties, which is put in a vessel made of iron, something in the form of pitch kettles on board of ships, or our saucepans; and these are called taches by the Chinese, and are fixed like our coppers in brick work in our kitchens; the person employed in firing keeps turning the tea with his hand for a certain time, a few minutes only, and then takes it out of the tach for a fresh supply; it is done very quick; I have seen this part of the process myself in the neighbourhood of Canton. The hyson and fine hyson skin and twankay leaves are twisted or rolled in the palm of the hand previous to their being fired; the blacks, I believe, do not undergo that process. In general, I think the leaves of the green teas are larger than the blacks. There are several sorts of tea in China, which have never been seen in Europe, and of such superlative quality, as to fetch amongst themselves the high prices of from eight to sixteen tales the *catty*. This account I had from a missionary, who was at Pekin sixteen years, and who I saw about twelve months before I quitted China. I have seen one kind of this tea, the leaf of which is nearly white, but very different from the pekoe, which you know has a whitish appearance.—Notwithstanding so much has been said by various people of the unwholesome and very prejudicial effects arising from the use of tea, I am of opinion it is quite erroneous. I have now been in the habit of *smelling* and *tasting* teas for the last eighteen years, the last four of which I passed in China, and you know how much my time was employed for days, weeks, and months, examining teas in this manner every day; besides which I always breakfast off it, and drink it in the afternoon, and if the article possessed any pernicious qualities I should certainly have felt it long before this. It is, I think, the drinking it *too hot* which makes it prejudicial, if it be so at all. I always drink it warm, but not *hot*. The green tea is a stronger astringent than the black, but I think it quite as wholesome; as proof of it, the Chinese themselves in the northern provinces of China and at Pekin drink nothing else but *green* tea. In the southern they drink wholly *black*.—If there are any other questions relating to the above subject you wish to know, and I can give, I shall have much pleasure in communicating it.

E. LARKEN.

In addition to the above testimony, Mr. Venn and Mr. Wright have been *tasters* to the East India Company of the teas which have been imported, and place marks on each chest of tea as good, very good, superlatively good, best, very best, extraordinary, fine, incomparable, the bloom, and so on in degrees of comparison, which we *Grammarians* are unacquainted with, but which directs the purchase; and these gentlemen have been employed upwards of 40 years, sometimes in a morning tasting seventy cups, of all sorts, and never found any thing in teas at all prejudicial to their healths: the former asserts, that Dr. Lettsom's account of Mr. Nash's losing his life by tasting of teas is founded upon mistake; and Dr. L. promised to alter the mistatement.

and a meal on it, including sugar and butter, is so expensive, they must forego what is more necessary for their support, in order to enjoy it.

When the *Chinese* first began to make use of tea as a beverage, we are not able to say, but it is probable that the ill taste of the water in many parts of the empire would induce them to look out for some vegetable to correct it, soon after they arrived at a state of civilization. The earliest account that we have of it is from two *Arabian travellers*, who visited China about the year 850, and relate that the inhabitants of that empire had a medicinal beverage, named *chah* or *sah*, which was prepared by pouring boiling water on the dried leaves of a certain herb; which infusion was reckoned an efficacious remedy in various diseases.* From the great revenue which these travellers inform us was levied from the consumption of *tea*, it seems then to have been as universally the favourite beverage of the Chinese in the ninth century, as it is at present.†

Giovanni Botaro, an eminent Italian author, observes, that the Chinese have an herb, out of which they press a delicate juice, which serves them for a drink instead of wine: it also preserves their health, and frees them from all those evils that the immoderate use of wine doth breed in us.‡

About the year 1600, *Texeia*, a Spaniard, saw the dried leaves in *Malacca*, where he was informed that the *Chinese* prepared a drink from this vegetable: and in 1633, *Olearius* found this practice prevalent among the *Persians*, who procured the plant under the name of *cha orchia*, from *China*, by means of the Usbeck Tartars. In 1639, *Stirkaw*, the Russian ambassador at the court of the Mogul Chan Altyn, partook of the infusion of *tea*; and at his departure was offered a quantity of it, as a present for the Czar Michael Romanoff, which the ambassador refused, as being an article for which they had no use in Russia.§

Tea was not known in Europe as a beverage, before the commencement of the seventeenth century. Some *Dutch* adventurers seeking, about that time, for such objects as might fetch a price in China, and hearing of the general usage there of a beverage from a plant of the country, bethought themselves of trying how far an European plant, of supposed great virtues,

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* Renaudot Anciennes Relations, Par. 1718, p. 31. Haller, Bibl. bot. I. 176. Letts. p. 21.
† Robertson's India, p. 96. ‡ Engl. Trans. 1630. Anderson's Commerce. § Letts. p. 20.

might also be relished by the Chinese, and thereby become a saleable commodity amongst them; and accordingly introduced to them the herb *Sage*, so much once extolled by the Salernian school of physic, as a powerful preservative of health: the Dutch accepting in return the *Chinese Tea*, which they brought to Europe. The European herb did not continue, long at least, in use in China; but the consumption of tea has been gradually increasing in Europe ever since.*

In 1641, *Tulpius*, a celebrated physician, and consul at Amsterdam, wrote in praise of the good qualities of tea. It is asserted that he did so by desire of the Dutch East India Company, who rewarded him with a considerable sum of money. In 1667, *Jonquet*, a French physician, extolled its virtues. In 1678, *Bontetre*, physician to the Elector of Brandenburgh, who had acquired great reputation, bestowed high encomiums on its qualities, in a dissertation which he published on tea, coffee, and chocolate. This work was attended with great success, and contributed not a little to render the use of it more general; and, before the end of the century, the consumption of it was considerable.

The introduction of *Tea* into England was about the year 1660, when the first mention of it was made in the statute-book, and a duty of fourpence a gallon laid on the liquor made and sold in coffee-houses.

A quantity of it being brought over from *Holland* in the year 1666 by Lord *Arlington* and Lord *Ossory*, tea soon came into request among people of fashion, and its use by degrees since that period has become †general. Hanway informs us, that at this time it sold for sixty shillings a pound.‡

From these small beginnings we have seen the infusion of a leaf from the farthest extremity of the earth become in a manner a necessary of life, in several parts of Europe, and the passion for it descend from the most elevated to the lowest orders in society. In 1785 it was computed that the whole quantity of tea imported into Europe was about nineteen millions of pounds, of which it is conjectured that twelve millions were consumed in Great Britain and its dependencies.§

Sir *George Staunton* informs us, that the annual public sales of tea by our East India Company did not, in the beginning of the eighteenth century,

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* Staunton's Embassy, Vol. I. p. 21. † Idem, p. 21. ‡ Journal, Vol. II. p. 21.
§ Robertson's India, p. 252.

much exceed fifty thousand pounds weight, independently of what little might be then perhaps clandestinely imported. The Company's annual sales now (the year 1797) approach to *twenty millions of pounds*; being an increase of four hundred fold in less than one hundred years, and answers to the rate of more than a pound each, in the course of the year, for the individuals of all ranks, sexes and ages, throughout the British dominions in Europe and America.

Since the year 1797, it is probable that the importation of tea has much increased, and that at least thirty millions of pounds are annually imported into Europe alone.*

PROPAGATION AND CULTURE.

In *Japan* the Tea-tree is cultivated round the borders of rice and corn-fields, without any regard to the soil. Seeds contained in the seed-vessels, from six to twelve or fifteen, are put into one hole, four or five inches deep. The seeds contain a large proportion of oil, which is liable soon to turn rancid; hence scarcely a fifth part of them germinate, and this makes it necessary to plant so many together. The seeds vegetate without any farther care: but the more industrious annually remove the weeds, and manure the land.

The leaves are not fit to be plucked before the *third year's* growth. In *seven years* the tree is usually cut down, and abundance of fresh shoots spring up. Some defer cutting it till it is of ten years growth.†

In *China*, wherever it is regularly cultivated, it rises from the seeds sown in rows, at the distance of about four feet from each other, in land kept free from weeds. It is seldom sown on flat or marshy ground, which is reserved for rice, but vast tracts of hilly land are planted with it, particularly in the province of *Fo-chen*. Its perpendicular growth is impeded for the convenience of collecting the leaves. Its long and tender branches spring up almost from the root, without much intervening naked trunk.

The tea-tree is cultivated in several of the provinces of China, but seldom more northerly than thirty degrees beyond the equator. It thrives best between that parallel and the line that separates the temperate from the

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* Embassy, Vol. I. p. 22. † Kæmpfer. Lettsom, p. 20.

torrid zone; though it is to be found also in the province of *Yunnan*, to the southward of it.*

The southern countries of Europe, and some provinces of North America, would suit it, particularly the latter, the heat there in summer being such, that vegetables make quicker and more early shoots, and therefore acquire more strength and firmness before the winter commences.

To propagate the Tea-tree in Europe it is necessary to procure seeds from China. Care must be taken that they be fresh, sound, ripe, plump, and moist internally. After being well dried in the sun, they may be inclosed in bees wax; or, left in their capsules, they may be put into very close canisters of tin or tutenag. *Thouin*, in his directions to *Perouse*, recommends these and other seeds to be placed in alternate layers of earth or sand, in tin boxes, closed up exactly, and placed in solid cases, covered with waxed cloth; the boxes to be placed in a part of the ship the least accessible to moisture, and the most sheltered from extreme heat or cold. Mr. *Sneyd* was very successful in having seeds packed up in absorbent paper, and surrounded by raisins or moist sugar, which kept them in a state fit for vegetation. *American seeds* are frequently brought over by putting them into a box, not made too close, upon alternate layers of moss, in such a manner as to admit the seeds to vegetate. This might be tried with the seeds of the Tea-tree; and to succeed more certainly, some of the seeds might be sown in pots or boxes, when the vessel arrives at St. Helena, and after passing the tropic of Cancer, near the latitude of thirty degrees north.

But the best method seems to be, to sow ripe seeds in good light earth in boxes, at leaving Canton; covering them with wire, to prevent rats and other vermin from coming to them; and taking care that the boxes be not exposed to too much air, nor to the spray of the sea. A little fresh or rain water should be sprinkled over them now and then; and when the seedling plants appear, they should be kept moist, and out of the burning sun. If young plants can be procured in China, they may be sent over in a growing state in boxes, forty inches long, by twenty inches broad, and as much in depth, having a few holes bored through the bottom.

When the trees arrive in England, they must be kept in a green-house during the winter, and in the open air during the summer. If they come

* Staunton, Embassy, Vol. II. p. 264. 466.

in bad condition, it may not be amiss to plunge the pots into which they are transplanted in a gentle hot-bed, or to set them in the tan-pit, to make them strike and shoot more freely.

Though the *Tea-tree* will not at present bear the rigour of our winters, in the open air, says Professor *Martyn*, in his account of the *Tea* in *Miller's Dictionary*, yet it is not impossible but it may *gradually become naturalized* to *our climate*, like the *Magnolia*, among several other trees and shrubs; especially if it were to be brought from the *coldest provinces of China*, where it grows, or from the *parts of Europe a little to the southward of us, when it shall have been naturalized there.**

It is doubted by some whether the *Olive* (Olea) might not be cultivated in Devonshire, a county equal to the whole of the *Genoese* territories, and not less than all the *Balearic islands*, which was once a monarchy. This county contains 1,600,000 acres. Its seasons are so mild that here the *myrtle* remains out the whole of the winter, and snow is never seen more than two or three days on the ground. The scenery of this county is most beautiful, whether we view the Teign, the Dart, or the Tamar, and their verdant banks, or take a general survey of the whole county, we shall find it charmingly diversified with hill and valley, the vales filled with villages, surrounded by gardens and orchards, and the hills covered with wood, or cultivated with corn to their summits. Add to this a beautiful view frequently of the sea, the shore presenting to our sight grand and secure bays, filled with fleets, the sources of our wealth and commerce, and the proud bulwarks of England. On the other hand, the prospect is bounded by the Darthmore mountains, which screen from the north, rivers issuing from its sides, which give a fine finish to the beautiful landscape, worthy indeed the pencil of a *Wilson*, or a *Claude*.

It is here, to render this county more truly a Paradise, that the *Tea* and *Olive* should be first cultivated. This latter evergreen seldom becomes a large tree; but two or three stems frequently rise from the same root, from twenty to thirty feet high, putting out branches almost their whole length, covered with a gray bark. Leaves stiff, about two inches and a half long, and half an inch broad in the middle, gradually diminishing to both ends, of a lively green on their upper side, and hoary on their under, standing

* Vide Martyn's Miller's Gardener's Dictionary, article Thea, *Tea*, the end.

opposite. The flowers are produced in small axillary bunches; they are small, white, and have short tubes, spreading open at top. The fruit is a superior berried drupe, of an oblong form, and of a yellowish green colour, turning black when ripe: flesh hardish, thick, glaucous: shell bony, ovate-oblong, acuminate at both ends, above at the tip marked with two oblong lateral calluses, the rest of the surface very obscurely wrinkled; it is thick, and divided within into two cells; one of them however is very frequently obliterated, one only being fertile, and that lined with a highly polished cartilaginous crust. Receptacle filiform, springing from the bottom of the cell, and fastened to the side of it, reaching upwards to the seed, and inserted a little below the tip into the umbilical scar. Seed oblong, roundish, acuminate downwards, pale dun or straw-coloured.*

The common mode of making *oil* from Olives in the kingdom of Naples is to crush the fruit to a paste with a perpendicular mill-stone, running round a trough. This paste is put into flat round baskets, made of rushes, piled one upon another under the press. After the first pressure, scalding water is poured into each basket, its contents stirred up, and the operation repeated till no more oil can be skimmed off the surface of the tubs beneath. By this method the oil is seldom pure, keeps ill, and soon grows rancid.

Another process is recommended, which is performed by pounding the fruit in a mortar. A handful of the crushed substance is thrown into a long woollen bag, which is rubbed very hard upon a sloping board, and then wrung; afterwards hot water is added, and it continues to be pressed as long as a drop of oil can be drawn from it. This is supposed to have been the original mode of extraction, and if performed by a skilful stout workman, to be much more effectual than the common one.†

The *Olive*, in all ages, has been held in peculiar estimation, as the bounteous gift of heaven. It is still considered as emblematic of peace and plenty; and the great quantity of oil which it produces in some countries, effectually realizes the latter of these blessings.

Unripe olives pickled, especially the Provence and Lucca sorts, are to many persons extremely grateful, and are supposed to excite appetite and promote digestion. They are prepared by repeatedly steeping them in water, to which some add alkaline salt, or quick lime, in order to shorten the oper-

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* Gærtner. † Swinburne's Travels, Vol. I. p. 373.

ation; after this they are washed, and preserved in a pickle of common salt and water, to which an aromatic is sometimes added.

But the principal consumption of Olives is in the preparation of common salad oil. The best is of a bright pale amber colour, bland to the taste, and without any smell. It becomes rancid by age, especially if kept in a warm place. It congeals by cold at 38° of Fahrenheit's thermometer, and does not become rancid if kept in a degree of cold equal to the freezing point of water. All the mild expressed oils of vegetables are nearly of the same nature; a preference however is generally given to the most fluid; hence the oils of Olives and *Almonds* are most commonly directed for internal use in medicine.

The *Olive* is commonly supposed to be a native of the southern countries of Europe: but it seems probable, that although it be now found wild in some parts of our continent, it came *originally* from *Asia*. It grows abundantly about *Aleppo*, mount *Lebanon*, and many parts of *Palestine*. In the northern parts of *Africa*; and one of the varieties at the *Cape of Good Hope*.

It appears by the catalogue of the botanic garden at Oxford, that it was cultivated there in 1648.*

Several Olive trees were planted against a warm wall at Camden House near Kensington, which succeeded very well, till their tops advanced above the wall; after which they were generally cut down to the top of the wall in winter. These in 1719 produced a number of good fruit, which grew so large as to be fit for pickling, but after that time their fruit seldom grew to any size. With a little protection in severe frost, the Olive tree may be maintained against a wall, in the latitude of London; but in Devonshire there are some of these trees, which have grown in the open air many years, and are in a very flourishing state.

The Olive was, by the ancients, considered as a maritime tree, and they supposed it would not thrive at any distance from the sea; but by experience, we find it will thrive very well in any country, where the air is of a proper temperature, though it is found to bear the spray of the sea better than most other plants.

We would recommend the same attention here as with the Tea tree, to obtain seeds from the more northern parts of Europe, and to endeavour to

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* Hort. Kew.

A Cutting

The Fruit

Unripe Ripe

Olea Europæa or European Olive

Sowerby pinx. Wetton sculp.

London Published by Dr Thornton May 1.1809.

raise the plants from seeds produced in this climate, which might possibly be accomplished in some particular years with attention.

I shall next mention the *Tobacco* (NICOTIANUM). Sir *George Staunton* informs us that great quantities of Tobacco are planted in the low grounds of *China*, through which the embassy passed: and that there is no traditional account of its being introduced into that country, or into India, where it is likewise cultivated and used in vast abundance. In neither country are foreign usages suddenly adopted. It is possible that, like the *Gin-seng*, it may be naturally found in particular spots, both in the old and new world.*

Nieuhoff (in 1662) says, that the weed called *Tobako* by the Malayans and Javanese after the Portuguese, grows in *all parts of the Indies*. We are not told whether the plant cultivated in the east is shrubby or herbaceous; but Nieuhoff informs us, that about Batavia it grows to the height of eight feet, with leaves of eighteen inches long and eight broad.

Tobacco was cultivated in England before 1570, as appears from *Lobel*.† According to *Linnæus* it was known in Europe from 1560. *Hernandez de Toledo* is said to have sent it into *Spain* and *Portugal*, when *Nicot*‡ being resident in the latter from the Most Christian King Francis II. sent it to *Catherine de Medicis*, as a plant of the new world, possessing extraordinary virtues. *Gesner*, in his Epistolæ Medicinales, fol. 7, dated Nov. 5, 1565, relates some trials which he made on it; and adds, "a Gallis Nicotiana vocari audio, nomine legati cujusdam qui Galliæ intulerit, ab aliis Pontianam." He had only then learnt from *Thevet* that it was used in America for smoking.

Sir *William Baker*, in his Chronicle (p. 400, ed. 9, 1696), affirms that *Tobacco* was first brought into England from the *West Indies* by *Ralph Lane* in the 28th year of Queen Elizabeth, 1586. But this account must be understood of smoking the herb, or else it is inconsistent with the cultivation of it in 1570, as related by Lobel.

Hakluyt, in his Remembrances made in the year 1582, says, that "the seed of *Tobacco* hath been brought hither out of the *West Indies*, that it groweth here, and with the herb many have been eased of the rewmes," &c.

Tobacco it is well known is of a narcotic quality, which it generally discovers, even in a small quantity, when first applied. Even a small quantity,

* Embassy, Vol. II. p. 174. † Hort. Kew. ‡ Hence its scientific appellation *Nicotiana*.

snuffed up the nose, will sometimes produce giddiness, stupor and vomiting; and when applied in different ways, in larger quantity, there are many instances of its more violent effects, even of its proving a mortal poison. In all these instances it operates in the manner of other narcotics: but along with its narcotic qualities it possesses also a strong stimulant power, perhaps with respect to the whole system, but especially with respect to the stomach and intestines; so as readily, even in no great doses, to prove emetic and purgative.

The practice of taking Tobacco in snuff, by smoking and chewing, have now been common in Europe above two hundred years. Like other narcotics, the use of it may be introduced by degrees, so that its peculiar effects, even from large quantities, may scarcely appear: it has however its limits, so that in persons who have been long in the habit of taking it, going only a little beyond the dose to which they have been accustomed, very violent effects are sometimes produced.

Sir *Walter Raleigh*, on his return from *Virginia* in *America*, is said to have first introduced the smoking of Tobacco into England. In the house where he lived at Islington, are his Arms, with a Tobacco plant on the top of the shield.* *Parkinson* says, that although this kind of Tobacco be not thought so strong or sweet for such as take it by the pipe, yet he had known Sir Walter Raleigh, when he was a prisoner in the Tower, make choice of this sort, to make good Tobacco of, which he knew so rightly to cure, as they call it, that it was held almost as good as that which came from the *Indies*, and fully as good as any other made in England.†

Tobacco is cultivated in the open fields in several parts of the continent of Europe, and might without doubt be advantageously grown in England, if there was not an *act of parliament* to prevent it. Small attempts at raising Tobacco have been made, which promised success. A plantation in the last century being found to thrive, *Cromwell*, probably at the requisition of the Americans, sent a troop of horse to trample it down. This prohibition, although we have lost America, still continues.

To pass over a number of other articles, the *Rhubarb* (Rheum) has been effectually naturalized in this country. Two sorts are chiefly imported for medical use, viz. the Chinese and Turkey Rhubarb, named from the coun-

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* Gent. Mag. Jan. 1791. p. 17. † Theat. 712.

tries whence this useful drug is obtained. The first is brought to us in oblong pieces, flattish on one side and convex on the other, compact, hard, heavy, internally of a dull red colour, variegated with yellow and white, and when recently powdered appears yellow. The artful *Chinese* are in the habit of cementing the fine yellow powder of the young roots over the larger pieces, or even colouring them with the yellow dye of the buckthorn berry, or gamboge, which are dangerous drastic purges. The second is esteemed the most, and comes to us in roundish pieces, with a large hole through the middle of each; it is softer, and when broken present many streaks of a bright red colour.

The first account we have of the Rhubarb being raised in England is from *Parkinson*, who says "he received the seeds from Asia in 1629, from beyond the seas, by a worthy gentleman, Dr. *Lister*, and the *Rhapontic Rhubarb* first grew with him before it was ever seen or known elsewhere in England." This was long supposed to be the true Rhubarb, until the *waved* or *undulated Rhubarb* (RHEUM UNDULATUM) was discovered. This was raised in the Leyden Botanic Garden, and the seeds were sent by the great *Boerhaave* to our famous Gardener *Miller* in 1759, by the title of the *true Chinese Rhubarb* (RHABARBARUM CHINESE VERUM), which succeeded very well, and *Linnæus* fixed on it the appellation of *the true Rhubarb* (RHEUM RHABARBARUM). But in order to ascertain what the *Turkey Rhubarb* was, which comes from Thibet mountains in Tartary, the great *Boerhaave* got from a Tartarian rhubarb merchant the seeds of the plants which produced the roots that he annually sold, and were admitted at St. Petersburgh to be the genuine Rhubarb. These seeds were soon propagated, and were discovered by him to produce two distinct species, namely, the *undulated Rhubarb* (RHABARBARUM) of Linnæus, or as it has since been called, RHEUM UNDULATUM; and *another*, a specimen of which being presented to Linnæus, he declared it to be a new one, and introduced it in his second edition of the Species Plantarum by the name of *palmated Rhubarb* (RHEUM PALMATUM). Previous to this Dr. Gorter had repeatedly sent the seeds to Linnæus, but the young plants which they produced constantly perished; at length he obtained the fresh root, which succeeded very well at Upsal, and afterwards enabled the younger Linnæus to describe this plant in the year 1767. But two years antecedent to this, Dr. Hope's account of the *palmated Rhubarb*, as it grew in the botanic garden near Edinburgh, had been read before the Royal Society

in London. The seeds were first introduced into Great Britain in 1762 by Dr. *Mounsey*, who first sent them from Russia;* and these seeds were quickly dispersed over the island. At the same time that Dr. Hope cultivated them at Edinburgh, Professor Martyn raised abundance of the plants in the botanic garden at Cambridge, from Dr. Mounsey's seeds, which all produced the *R. palmatum*; and I have some of the Doctor's original packet still by me. It appears that the seeds sent from St. Petersburgh to this country almost uniformly and constantly produce the *R. palmatum*, and not sometimes *R. undulatum* also, as De Gorter relates the seeds to have done which Boerhaave obtained from the Tartarian merchant. This however does not prove that other species, as the *undulatum*, and even the *compactum*, the *thick-leaved Rhubarb*, do not yield the true Rhubarb, as well as the *palmatum*. We have seen that the *undulatum* was sent from Tartary with the *palmatum*, for the genuine plant; and Georgi relates that a Cossack pointed out the same species to him for the true Rhubarb. Both he and Pallas remark, that possibly the root of *R. undulatum* may be better on the more southern open and dry mountains of Tibet, than on the colder wet mountains of Siberia. Professor Pallas relates that in Bukharia the *R. palmatum* seems to be unknown, and that as far as he could collect from description, the species they consider there as the true one is the *compactum*, the seeds of which, Mr. Miller informs us, were sent to him from St. Petersburgh as the true Tartarian Rhubarb.

Since the true *Russian* Rhubarb was introduced by Dr. Mounsey in the year 1762, or soon after, and was cultivated by Sir Alexander Dick and Dr. Hope of Edinburgh, with a view to bring it into use as a medicine, it has been a question whether the root could attain the same qualities in our climate, that it has where it is a native. That Britain is not too cold for it appears clearly from the success with which it has been cultivated in Scotland; if it meets with any difficulty here, it must be from the moisture of our climate, and there can be no doubt but that a dry soil should be chosen for it. The chief obstruction to giving the root here a quality equal to foreign Rhubarb, appears to be the difficulty of curing it properly; but this is in a great measure got over, and no doubt will be fully conquered by farther experience, if encouragement should be given to the more extensive cultivation at home of this most useful plant.

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* Woodville.

A. Cutting.

A. Leaf.

Rheum Palmatum, or Officinal Rhubarb.

And surely Rhubarb merits some encouragement, if it be true that not less than 200,000*l.* is paid annually for what is imported into this country: especially if we consider the difficulty there may be of procuring this article from Russia, the inferiority of the Chinese Rhubarb, and the adulterations that are practised to render the foreign drug fair to the eye. There remains only to convince our countrymen that British Rhubarb is equal to the foreign; or if it be a little inferior, that inferiority is owing merely to a want of skill in curing it, which skill will soon be attained by experience.

The late excellent Dr. Hope, who with Sir Alexander Dick was indefatigable in cultivating the *Rheum palmatum* for medical use, relates in the year 1784, that most of the apothecaries in Edinburgh used no other than what is raised in Scotland; that for several years there has been no other employed in the Royal Infirmary; and that when a sound root is well dried, and properly dressed, it is in no respect inferior to what comes from Russia.

The Society for the Encouragement of Arts, Manufactures, and Commerce, has exerted itself for many years in promoting the cultivation of the *Rheum palmatum* in Great Britain, and with much success.

Sir John Dick had the gold medal of the Society for a memoir on the culture and drying of it. Sir William Fordyce, so early as the year 1780, took up three roots, six years old, weighing when washed ten pounds six ounces avoirdupois. He stripped off the bark from the smaller roots, and cut off most of it from the larger parts; and hung them up in festoons on packthread, three or four inches from each other, at a moderate distance from the fire. From these roots he made one pound four ounces of Rhubarb, as fit for the market as any imported from Russia, Turkey, or China: he obtained likewise one pound more fit for private use, or to be powdered. The roots should be cleared entirely of the rind; for the parts which are covered with it will be apt to turn mouldy. Large pieces should have a perforation made through the middle, that they may dry more perfectly, with less fuel and in less time.

At the end of six or seven years, when the plant seems to arrive at its most perfect state, one pound of Rhubarb may be obtained from every five pounds of the green roots; besides an equal or larger proportion of roots fit for family use, or powder in the shops.*

* Trans. Arts, Vol. II. p. 76.

In 1791, the gold medal of the Society was given to this gentleman for raising above three hundred plants of the true Rhubarb from seed, and transplanting them at four feet distance.*

Nathaniel Jarman, Esq. of Brenley-house in Kent, sowed sixty seeds, being part of those which were sent to the Society by Dr. Mounsey in 1764; they produced forty-five plants. In 1784 he raised upwards of a hundred and twenty plants in the common ground, from seeds of the preceding year. He had sent to the Society two roots, weighing twenty-eight and thirty pounds: but this year he sent a single root, which weighed, when taken up on the 16th of October, fifty-six pounds: in a few days it lost four or five pounds, and on the 8th of November, when it was weighed before a committee, it was found to weigh only forty-five pounds. The largest root before produced to the Society by Sir Alexander Dick weighed forty-two pounds.

Mr. Robert Davis the younger, of Minehead in Somersetshire, merchant, in the spring of the year 1779, sowed some seed of *Rheum palmatum*, which he received from Dr. Brocklesby, and planted out seven hundred and twenty of the plants, at the distance of five feet. The soil for the most part was sandy and light, the rest a deep black loamy garden ground. A great number of plants on the first soil died; but those on the latter continued for the most part vigorous, and produced larger roots than the other, although not superior, if equal in quality. It did not appear that the distance of five feet in any respect incommoded or injured the most luxuriant plants.

In the summer of 1783, the whole plantation was taken up, and the number of roots was near, if not quite four hundred. The whole produced three hundred pounds of dried Rhubarb.†

The gold medal of the Society was adjudged to Mr. John Ball, surgeon at Williton, in the parish of St. Decumap, in the county of Somerset, for raising in 1788 upwards of four hundred plants of *Rheum palmatum*, standing six feet asunder each way.

The following year having by the severity of the winter lost fifty of the four hundred and thirty plants above mentioned, he filled up the vacancies with young plants, and planted upwards of six hundred more at six feet apart, and about two hundred at four feet. For this additional plantation he received another gold medal.

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* Trans. Arts. Vol. X. p. 101. † Idem, Vol. III. p. 174, 176.

It appears that some of Mr. Ball's roots, of five years old, weighed, when fresh, upwards of seventy pounds; and that he used the bark for tinctures, finding it full as good in every respect as the best part of the root. His practice is to manure or dress them with rotten dung, coal ashes, lime, mould, old mud wall, &c.*

In 1792, Mr. Thomas Jones, of Fish-street-hill, London, planted four hundred and twenty plants of *Rheum palmatum*, at six feet distance, at Four-tree-hill, Enfield, Middlesex, and had the gold medal adjudged to him by the Society.

The same year, Mr. Halley, of Pontefract in Yorkshire, had the silver medal for producing samples of Rhubarb better cured than any that had been produced before. It seems that his father had been in the habit of raising large quantities of the roots, which in war time he disposed of very freely, but in time of peace the druggists procured it from abroad at a lower rate.†

In 1793, the gold medal was adjudged to Mr. William Hayward, of Banbury, in Oxfordshire, for raising full eight hundred plants of the true Rhubarb: and a third gold medal to Mr. Ball, for possessing one hundred and fifty eight pounds of it, of his own growth and curing, equal in quality to Turkey or Russia Rhubarb; and communicating his culture of it.‡

The year following, Mr. Ball had a fourth gold medal adjudged to him, for possessing ninety-seven pounds of the true Rhubarb of his own growth; and for communicating the culture and method of cure.§

In 1795, Mr. Robert Davis before-mentioned, of Minehead in Somersetshire, had the gold medal, for raising nine hundred and thirteen Rhubarb plants, and giving some account of their culture. Also the silver medal to Nicholas Ashton, of Woolton Hall, near Liverpool, Esq. for sending samples of Rhubarb very well cured. This Rhubarb was planted in 1778 or 1779, and was taken up and cured in October, 1795.‖

In 1797, the gold medal was adjudged to the Rev. James Stillingfleet, of Hotham, in Yorkshire, for his culture and cure of Rhubarb, of which he gives an ample detail. Also to Mr. Thomas Jones above-mentioned, for raising nine hundred and thirty-five plants, and giving a full account of his method of culture.¶

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* Trans. Arts. Vol. VII. p. 34. and VIII. p. 66.
† Idem. Vol. XI. p. 113, &c.
‡ Idem. Vol. XII. p. 225.
§ Idem. Vol. XIII. p. 178.
‖ Idem. Vol. XIV. p. 145, &c.
¶ Idem. Vol. XV. p. 157.

The following year, the same Mr. Jones had a reward of thirty guineas from the Society, for having raised and planted three thousand and forty plants of the true Rhubarb; making up the whole number raised by him nearly five thousand, since the year 1792. He here adds many excellent hints respecting its culture.*

Again this meritorious Gentleman applied for the gold medal, value thirty guineas, in the following address.

To the President.

Sir,

"The certificate which accompanies this communication will inform the Society, that I have planted in the year 1799 four thousand and fifty-three plants of the *Rheum palmatum*, or *true Rhubarb*: I once more, therefore, present myself as a claimant. Each time I have made my appearance in this character, I have pledged myself to future and more considerable exertions; for every distinction with which you have honoured me has been viewed in no other light than that of a powerful incentive to perseverance; and I need not add, how much gratification it will afford me, if the Society, by their decision on the present occasion, continue to me their good opinion.

"The period I have devoted to the cultivation of this valuable drug has now become of a sufficient length to prove experimentally the truth or falsehood of my theories. Happy am I in reflecting, and happier still in communicating to the Society, that since I last had the pleasure of addressing them, I have additional reason for *satisfaction*. In my former papers (see Transactions of the Society, Vol. XI. XV. and XVI.) having been, perhaps, more than sufficiently minute in describing my system of cultivation, I shall now only notice the nature of the soil and aspect; the former of which is a rich sandy loam, and the aspect inclining to the east and south: and, as the public are in complete possession of the opinions upon which it is founded, there is no occasion to repeat every particular point in the present instance. I shall therefore content myself with merely mentioning some, and enlarging upon others, as necessity may require.

Conceiving it to be good policy for a man to avail himself of every advantage that is presented, I have recommended spring as well as autumnal sowings, and the plants of each, when arrived at a proper size, to be placed in

* Trans. Arts. Vol. XVI. p. 213.

the nursery-bed, at its opposite season. I persevere in this practice, lest the summer, in proving too dry, should be equally detrimental as too wet a winter: but as draining the seed-beds may be so easily effected, and the safety of the plants necessarily ensured, so now, without on any account neglecting the former, I principally depend on the latter sowing for a succession: besides, it is attended with the least trouble and expence; and if throughout the operation is well attended to, success is nearly reduced to a certainty.

Again, I have somewhere observed, that a proper mode of cultivation would greatly facilitate the cure of this root; in other words, good management will ensure its welfare till its arrival to a proper age: and that this has ever appeared to me of the most absolute necessity, I have never failed to represent. By nothing else can it acquire that degree of woodiness, in which I suspect the principal *secret* of its cure consists. Age too is necessary to give the plant its proper growth; otherwise, when it undergoes the operation, its pieces will be diminutive, insignificant, and unprofitable. Above all, it is entirely indebted to age for its medical virtues; and I firmly believe, that to this, more than to soil or situation, it is owing that the Turkey has been hitherto considered superior to the English Rhubarb.

In this place permit me to introduce an opinion that I have for some time entertained, viz. that those parts of the root are of the finest quality *that are the farthest removed from the seed.* This difference is easily discoverable from its earliest stages; and so assured am I of the fact, that, but for want of a supply of offsets, and one or two other considerations, I should be almost tempted to abandon my present, in favour of this mode of cultivation. But though, in this respect, the Rhubarb is evidently superior, yet it should be recollected that the other is less precarious, and its growth and produce much more considerable.

Although, according to every public testimony, of which mention will presently be made, I have reason to believe my progress has been more considerable than that of my contemporaries, if there are any, yet I have no conception that we have arrived at the *ne plus ultra.* Let us rather hope, that every succeeding year will be productive of a degree of improvement proportionate to the advantages of increased experience. As we are so much indebted, therefore, to the age of our plants, let me caution all who have, or may engage in this undertaking, never to yield to impatience; for, with a

few persons, the prejudices against the English Rhubarb are many, and deeply rooted; and to this source most of them may be traced. Nor is this very wonderful; for to entertain high expectations of Rhubarb prematurely taken up, is no less extravagant, than to suppose the capacity of a child equal to that of an adult: yet hitherto our market has been a stranger to any other than such a commodity.

That I never expected to introduce it into general practice without opposition, is evident from my last papers in 1798; for I there remarked, that very probably, before this could be effected, certain difficulties must be overcome, the principal of which I apprehended to be an almost universal prepossession in favour of foreign commodities. Moderation on the part of the cultivator in the regulation of his prices, and an unwearied attention to its quality, are the only means likely to produce a counteraction. To great attention to these points I attribute all my success. Mere recommendation ought ever, in such a business as this, to be placed out of the question. If the article will not bear the tests of examination and trial, it should not be indebted to any thing else.

Whenever I have submitted any specimens to public examination, at an hospital or elsewhere, my constant language has been, 'I have no wish but that they may rise or fall according to their own intrinsic merit or demerit; and if worthy of approbation, by this means induce their general adoption. That this being, no doubt, the ultimate object of the Society of Arts, who have thought proper to honour me with several distinctions, I feel myself impelled to forward it to the utmost, and not remain contented with its mere cultivation.' I have proceeded to state the great expence this country incurs by so large an importation, and on this account urged its general adoption, in order to lessen the expence on the score of duty. That although I am influenced by such motives, and many others, yet my own individual interest I have at the same time fairly acknowledged to be among the number; and I have concluded with expressing an hope, that while pleading the general, as well as my own particular cause, perhaps the benefit of such institutions may be the necessary consequence of introducing a valuable and efficacious medicine, at a comparatively trifling expence. I have never yet made this appeal in vain; and the Society will, I dare say, receive with much satisfaction the intelligence that Rhubarb of English growth is now used at Guy's (I mention the hospitals in the order of its introduction), St. Thomas's, and

St. Bartholomew's; and is under trial at several others. Still further to inform myself of the public opinion, I have lately requested an interview with a numerous and most respectable committee at Apothecaries-Hall: it is impossible, without a breach of propriety, to repeat the compliments its members were pleased to pay me: whether I deserve them or not, it would be equally improper in me to determine; but of this the Society may be assured, I never will rest till I do. In a word, my purpose was fully answered. The article which I exhibited met with the most unqualified approbation, and full permission was given to publish this circumstance. I beg leave, before I conclude, to apologize for the egotism which prevails throughout this communication. It is scarcely possible to avoid it, when, in cases like the present, a man is under the necessity of speaking of himself.

It is a subject I have much at heart, and it would give me much real concern to keep back a single circumstance likely to be useful to future cultivators. Its production and adoption, with the attendant difficulties, have been to the best of my abilities amply considered; the former in the communications beforementioned, the latter in this paper. If the Society are of opinion that the steps I am pursuing to effect this last and desirable purpose deserve success, it will be highly flattering. Under their auspices I commenced my plantation eight years ago, and I hope and trust my proceedings since have been such that the purpose to which it has been appropriated will occasion no regret. I am, Sir, your very humble servant,

THOMAS JONES."

Specimens of English Rhubarb underwent a severe trial at Bath by three eminent physicians there, Drs. Falconer, Parry, and A. Fothergill.

Dr. Falconer reports, that the two specimens of English Rhubarb answer in external marks to the characters of the drug when good; that they are rather inferior in delicacy of taste to Turkey Rhubarb, but superior in some respects to the East Indian; that perhaps they might have resembled the Turkey still more clearly, had they been dug up as long a time, and a careful selection of the best pieces had been made. The red colour is said to be improved by keeping: and Linnæus advises it to be kept ten years before it is used. Vogel relates, that an apothecary is sent with the Russian caravan that goes to the borders of China to purchase Rhubarb, to whom all the Rhubarb is delivered, and he is strictly ordered to select carefully the best pieces only, and to burn all the decayed and bad. Upon the return of the

caravan to Moscow or Petersburgh, it is again put into the hands of persons skilled in pharmacy, who have the care of its being properly dressed, and of none but the true sort being admitted: so that after all these cautions none but the choicest and fairest pieces can be exported. If then such a selection were made here, and it were kept a due time, the British Rhubarb might probably equal any of the foreign; especially if other circumstances were attended to, which will be mentioned, when we come to the culture and curing of it.

This account may serve to show both the ardour of this respectable Society in encouraging the growth of this useful article, and the persevering industry of some gentlemen in overcoming all the difficulties attendant on introducing a new plant into cultivation, finding out the means of curing it as an article for extensive sale, and overcoming the prejudices of such as cannot persuade themselves that a drug of British growth can bear a competition with what is sent us from foreign countries.

To conclude. The Duke of Athol has raised Rhubarb in Scotland, which was thought by eminent druggists, and gentlemen of the medical profession in London, to be nearly if not quite equal to the Russian, in smell, taste, and effect. By paying a little more attention to the curing, they conceived that its beauty might be increased: upon which, the year after, his Grace sent up specimens of still superior quality.*

It having braved the climate of St. Petersburgh, and succeeded well in Scotland, is a sufficient proof of its hardiness. Dr. Robertson informs us that it grows luxuriantly in Perthshire (lat 56): that gardeners and others raise it there in great perfection; and that there is in Scotland a constant demand for it as a medicine.

The next article I shall mention is the *white Poppy* (PAPAVER ALBA), which originally came from Asia, and is there much cultivated, and which produces the Opium imported from thence, which comes to us in flat cakes, covered with leaves: it has a reddish brown colour, inclining to black, and a strong peculiar smell. Six hundred thousand pounds of it are annually exported from the Ganges! It is remarkable that the seeds possess not any or a very slight narcotic quality. They consist of a simple farinaceous matter, united with a bland oil, and serve as food in some countries, and are given to fatten poultry.

* Bath Papers, Vol. III. p. 445.

The manner in which this drug is collected in the East has been described long ago by Kæmpfer and others; but the most circumstantial detail of it is given by Mr. Kerr, in the fifth volume of Medical Observations and Inquiries.

When the capsules are half grown, at sunset, they make two longitudinal double incisions, passing from below upwards, and taking care not to penetrate the internal cavity. In Persia, according to Kæmpfer, a five-pointed knife is used for this purpose. The incisions are repeated every evening, until each capsule has received six or eight wounds: they are then allowed to ripen their seeds. If the wound were to be made in the heat of the day, a cicatrix would be too soon formed. The night-dews favour the extillation of the juice.

Early in the morning, old women, boys and girls collect the juice, by scraping it off with a small iron scoop, and deposit the whole in an earthen pot, where it is worked by the hand in the open sunshine, until it becomes of a considerable thickness: it is then formed into cakes of a globular shape, and about four pounds in weight, and laid into little earthen basins to be farther dried. These cakes are then covered over with poppy or tobacco leaves, and thus dried until they are fit for sale. Opium is frequently adulterated with cow-dung, the extract of the plant procured by boiling, and various other substances of which they make a secret.*

It appears that the Poppy may be cultivated for the purpose of obtaining Opium to great advantage in Britain. Professor Alston, of Edinburgh, said long since, that the milky juice, drawn by incision from Poppy heads, and thickened either in the sun or shade, even in this country, has also the characters of good Opium; its colour, consistence, taste, smell, faculties, phenomenona are all the same; only, if carefully collected, it is more pure and free from feculencies.

Similar remarks have been made by others; to which, says Dr. Woodville, we may add our own; for during that summer (probably 1792) we at different times made incisions in the green capsules of the White Poppy, and collected the juice, which soon acquired a due consistence, and was found, both by its sensible qualities and effects, to be very pure Opium. May I be permitted to add, that near fifty years ago I frequently amused myself with slashing the green Poppy heads, and collecting a most pure and well digested Opium from them?

* Woodville, p. 505.

But the merit of first cultivating the Poppy for Opium is due to Mr. John Ball, of Williton, who in the year 1796 was rewarded by the Society of Arts, Manufactures, and Commerce, for procuring Opium in an unsophisticated state from British Poppies, and communicating his mode of preparing it to the Society, for the use of the public.

When the leaves die away and drop off, the capsules or heads being then in a green state, is the proper time for extracting the Opium, by making four or five small longitudinal incisions with a sharp-pointed knife, about an inch long, on one side only of the head, taking care not to cut to the seeds: immediately on the incision being made, a milky fluid will issue out, which being of a glutinous nature, will adhere to the bottom of the incision; but some are so luxuriant, that it will drop from the head. The next day, if the weather should be fine, the Opium will be of a greyish substance, and some almost turning black; it is then to be scraped off, with the edge of a knife, into pans or pots; and in a day or two it will be of a proper consistence to make into a mass, and to be potted.

As soon as the Opium is all taken away from one side, make incisions on the opposite side, and proceed in the same manner. The reason of not making the incisions all round at once is, that the Opium cannot be so conveniently taken away; but every person, upon trial, will be the best judge. Children may with ease be soon taught to make the incisions, and take off the Opium, so that the expence will be trifling.

An instrument might be made, of a concave form, with four or five pointed lancets, about the twelfth or fourteenth part of an inch, to make the incisions at once.

Mr. Ball calculates, that supposing one Poppy to grow in one square foot of earth, and to produce only one grain of Opium, more than 50lb. will be collected from one statute acre. But since one Poppy produces from three or four to ten heads, each incision sometimes producing two or three grains, what must be the produce, and what the profit at the present price of Opium, 22*s.* the pound?*

I am sensible that great abatements must be made in practice from such theoretical calculations as these; and that in our moist climate many seasons will occur, and many days in almost every summer, unfavourable to the

* Trans. Arts. Vol. XIV. p. 260 to 263.

collection of the Opium. It is, however, with all its disadvantages, a very important object to cultivate the Poppy for this purpose in Britain; considering the great price of foreign Opium, the increasing call for it in medicine, the adulteration of what is imported by rice-flour and other articles, and the employment that it will find in the collection for women and children.

Mr. Ball adds, that in 1795, from a bed of self-sown Poppies five hundred and seventy-six feet square, he collected four ounces of Opium, though the plants were very thick; and from a few plants that stood detached he took from fifteen to thirty-four grains: this ground had been well manured with rotten dung. He remarks that semidouble flowers, and those of a dark colour, produced the most Opium; that the heads should be about the size of a walnut before the incisions are made; and that the foreign dried Poppy heads are full three times as big as ours.* Mr. Miller remarks also that they are of a different shape; but the size is only owing to climate, and the shape indicates no more than a variety.

Mr. Ball collected from one semidouble Poppy a quantity which he supposes to be more than thirty grains; but this plant had twenty-eight heads on it. He prefers the double and semidouble flowering plants to those which have single flowers. But I have observed that the single Poppy, cultivated by our physic-gardeners here for the seed and the heads, have generally larger heads than the double Poppy cultivated in gardens.

But after all, the point of most importance respecting the cultivation of the Poppy for Opium in Britain is, whether its quality be equal to that of foreign Opium. This has been fully ascertained, not only by a druggist in London having agreed with Mr. Ball to give him the same price for what he should make in the year 1795, as the foreign drug should bear at that time; but by the testimony of several eminent medical gentlemen in London who tried it, in consequence of the request of the Society for the Encouragement of Arts, Manufactures, and Commerce. Dr. Latham observes, that in its sensible qualities it does not seem inferior to any; that it possesses the excellence of being perfectly clean, which must always be an advantage when given in a crude state; and that probably the purified extract of the foreign would not be superior to the English. Dr. Pearson also reports, that he found the English Opium to be equally powerful, and to produce the same

* Trans. Arts. Vol. XIV. p. 264.

effects as the best foreign preparation of this drug. Mr. Wilson not only found the English drug equal in point of strength to the best extract from foreign Opium, but far superior in flavour, which, in the extract, is much injured by the boiling, and free from the impurities which are so abundant in crude foreign Opium.*

The next candidate for the premium of a gold medal, value fifty guineas, was the indefatigable Mr. Jones, who thus addressed the President of the Society instituted at London for the Encouragement of Arts, Manufactures, and Commerce.

Sir, In the summer of the year 1794 I cultivated a considerable number of *White Poppies* (entitled in the New London Pharmacopœia, Papaver Somniferum, and, in another place, Papaver Hortense semine albo), when a few of the heads or capsules having been broken off by the wind, I observed at the extremity of the stalks a substance in every respect resembling Turkey Opium. This accidental circumstance bringing to my recollection its method of production, as related in the Encyclopedia and elsewhere, I wounded a considerable number of them with my penknife, and, in the course of the day, collected a small quantity of the above-mentioned substance. As this circumstance took place while we were cutting lavender, it happened that an old and experienced servant, who was afterwards to distil it, was directing and assisting, and we agreed that it was *probably in effect equal to*, and was certainly *more pure* than any we had ever seen.

From this period I have never entirely lost sight of the object I am now to consider; but, on account of various avocations, and particularly my Rhubarb plantation, which at this time required all the attention I could spare, it was not in my power to engage in an undertaking of such magnitude; and more especially on a scale so extensive as that which I have already determined to adopt, under a persuasion that experiments, when more confined, are for the most part fallacious.

As preparatory, however, I have not failed every year to repeat the operation, at once establishing its practicability, and availing myself of many advantages which can only be derived from observation and experience.

The inclosed certificates will inform the Society that at length my plan

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* Trans. Arts. Vol. XIV. p. 267 to 270.

has been carried into execution, but not with the degree of success that ought, and might have been expected to attend so extensive an experiment.

It must be confessed, that had I been at all aware what an almost Herculean labour I was about to encounter, I really suspect whether my resolution would have been equal to the task. Lest, however, this should discourage others from prosecuting this object, it is necessary to be more explicit.

Difficulties, and such indeed as are considerable, must necessarily attend most undertakings which have been hitherto unattempted; but the disappointments I sustained, though more numerous than generally fall to the share of a person under such circumstances, did not all arise out of the undertaking itself, but from causes, some of which may be easily guarded against in future, while others may never again occur.

Two years have passed in producing what, I flatter myself, the Society will consider deserving their premium, particularly if I am enabled to render the operation much more simple than may at first sight be supposed.

The claimant, I observe, is required to submit to the Society his particular method of cultivating the Poppies. As the mode adopted in the present instance arose rather from necessity than choice, I must go back as far as the autumn of 1797, to show how it happened.

Five acres of ground and upwards, situated in the parish of Enfield, in the county of Middlesex, I appropriated to this experiment, at the period above-mentioned; which, being ploughed several times previous to the following March, were then sown broad-cast; and the weather proving favourable, the seed soon vegetated, and appearances were very promising. From the neglected state of the land, however, to which I was unfortunately a stranger, such a profusion of weeds sprang up among them, that, after many fruitless efforts at recovery, I was under the mortifying necessity of ploughing them all up together. This circumstance not taking place till the latter end of April, the season for resowing was elapsed; and as to cropping my field with oats or barley, a measure very strongly recommended to me, I considered it as a deviation from my original purpose, and therefore, without paying any attention to it, gave the field a summer-fallowing, conceiving that Poppies might be sown with equal and perhaps greater advantage in autumn.

Finding that the broad-cast method of sowing precluded the possibility of hoeing where the land is much infested with weeds, I now adopted a dif-

ferent mode, and drilled in the seed with a very simple yet efficient machine, which I purchased of Mr. Macdougal, of Oxford-street: but, as the weather began to be very severe so early as November, and continued so with few intermissions, the succeeding March found me very little forwarder. Yet I persevered, and once more resolved to drill the whole five acres: they came up extremely well, and, as I expected, accompanied with innumerable weeds; but these by well-timed application were eradicated, though not without considerable difficulty.

I now thought myself secure; for nothing could assume a better appearance, till the beginning of May. Alas! I could not foresee the cold and remarkably dry weather that ensued, and prevailed, I believe, for six weeks successively. Hence the growth of some became stunted, and others were entirely destroyed; but happily some warm refreshing showers fell just time enough to rescue the remainder.

From these I have procured upwards of *twenty-one pounds* of solid Opium, five of which, in compliance with the Society's requisition, I have sent for their inspection and examination.

At one time I began to despair of even procuring this, comparatively speaking, small quantity, though it is not a fifth part of what I ought to have had, owing to the extraordinary rains and winds which we experienced through the whole of the summer months.

This recital, as I have before observed, ought on no account to intimidate others from a co-operation; for it is obvious, that the former inconveniences originated in my own ignorance, whilst the latter depended upon causes that in all probability may never occur again.

Mr. Ball, in a letter published in one of the volumes of the Society's Transactions, advances an opinion which I consider as very fallacious, respecting the quality of land adapted to the growth of Poppies. He seems to be very little acquainted about this point, and hints the probability of their being cultivated almost every where. I well know that Poppies, like many other vegetables, will grow in soils of every description; but of this I am fully assured, that, like the rest, they have all their particular and favourite soil, viz. a sandy loam, and that the better this is, the more advantages will accrue to the cultivator: for it should be considered, that, in bad, as well as good ground, the same expences of cultivation, scarification, and collecting, will be incurred, for perhaps a fourth share of the produce.

I shall now lay before the Society some general remarks on the cultivation of Poppies, and then conclude with submitting a few hints and directions respecting the preparation of Opium.

Having a tap-root, their size will consequently be proportionate to the depth of earth they are enabled to penetrate. Hence the necessity of land that will admit of deep ploughing. The fineness of the surface too is very essential. As the seed is so small, and the plants, on their first coming up, so exceedingly tender, the bush-harrow should always be used after those which are commonly employed. By this means a greater number are likely to vegetate, and from being better protected, are less liable to injury.

Poppies (and when I use this name, I mean that particular kind before specified) may be cultivated both by the drill and broad-cast mode of husbandry: at the same time it must be remembered, that the land for each requires a different disposition. In the former this is not so material, the sowing-machine regulating the distances of the rows according to the will of the operator: these ought to be nine inches or a foot asunder, and in beds containing four rows, allowing a foot and a half between each. But, with respect to the latter, this point must be strictly attended to: the ridges should never exceed four feet in breadth; so that the furrows will answer the double purpose of preserving the land throughout the winter, and, in the season for collecting the Opium, serve as paths to the workmen.

Besides two chances of a crop, I am decidedly in favour of autumnal sowing; and the first week in September seems to be the most favourable period for this purpose. If the weather continues open, they will make such a progress as to be capable of resisting the severity of an inclement winter, without on the other hand being too forward; a circumstance highly dangerous, as the first severe frost is inevitably destructive.

On this account, whether by the drill or otherwise, a larger proportion of seed should be sown at this season, for the plants will defend each other; and as all the plants will not be equally forward, so, let the winter prove what it may, provided the seed has vegetated freely, there will be great probability of a good appearance in spring. If unfortunately, however, such a winter as the last should again occur, and the whole plantation fail, a circumstance which has happened to myself, the spring sowing ought not to be deferred longer than the first week in March.

I do not, without sufficient reason, recommend that this operation should

be performed in autumn. The Poppies are not only generally larger, but even, when this is not the case, I know from experience, that they will yield a much larger proportion of Opium; for it seldom happens that a spring Poppy will bleed, as we term it, more than twice, while the others will bear scarifying till they are nearly ripe. This I imagine can only arise from the length of time the one has been in the ground in comparison with the other. Indeed the difference is so striking, that if the present winter destroys my plants, I shall be almost tempted to dispose of my spring-sowing to other purposes. In drilling, the necessity of covering the seed by harrowing is suspended by the operation of the machine; and, in the broad-cast method, a shower of rain will have all the effect without further trouble or expence.

Excepting great additional care, turnip and poppy hoeing are similar, and in every respect may be conducted in the same manner. I believe the turnips are rather benefitted, they certainly are not injured by being shaken, and will recover from the effects of a wound; but if the Poppies are accidentally touched, they will either exhaust themselves by bleeding, or dwindle so as to be of no value. But it is high time to proceed to the last point I proposed to consider, namely, the production and preparation of Opium.

In ordinary seasons, the heads or capsules of the autumnal Poppies will be large enough for our purpose in the month of June; for at this time they will have attained about half their growth, or to be equal in size to a small tea-cup. I have invented a variety of instruments as scarificators; but as only two kinds were actually used, I am unwilling to trouble the Society with a description of any other.*

Seven, and sometimes eight boys, were employed, from eight to twelve

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* Mr. Jones has since added the following description of the instruments, and their mode of application. They remain in the Society's repository.

The first of these instruments consists of two thin steel blades, fixed by a wedge in a wooden handle, so as to make incisions about one fourth of an inch from each other.

The other is made entirely of steel, and resembles in form the tuning-fork of an harpsichord. It consists of four bars, proceeding from a handle of a convenient length, a quarter of an inch wide, and two and a half long, each terminating with a bolster, through which a screw passes that fixes the scarificators. The centre bars should be so elastic as to yield to the curvature of the capsule, upon the outer ones being pressed by the finger and thumb; and by this means four incisions are made at once, at equal distances. This instrument is an inch and three quarters in width; but, from the two outer blades, only an inch and a quarter. The bolsters are a quarter of an inch in diameter, and the scarificators a proportionate length, namely, three eighths. The wedge in the former, and a longitudinal aperture in the scarificators, or blades, of the latter, will regulate the depths of the incisions, at the will of the operator. It is of the utmost importance that these should not be made through the inner corner of the capsules.

years of age, together with a man as a superintendant. The children's book, which accompanies the instruments, contains only an account of six, as the eldest, being the son of my gardener, is included in another book. To the youngest I gave three-pence per day, and, if tractable and well disposed, an additional penny for every additional year.

The steel instrument was used by the latter, and the others by the former. I have great reason to be satisfied with their construction; for, notwithstanding their simplicity, they proved themselves fully equal to my purpose; and so considerable a trial has not suggested any other improvement, than that in the largest the two inner bars only should be elastic; for the continual pressure of the finger and thumb on the two outer ones, which is absolutely necessary for the others to act, would be avoided, and consequently some fatigue and inconvenience prevented.

It is of very little consequence whether the first incisions are made horizontally or vertically, with this instrument; for however luxuriantly the milk may flow, by making four at one time, it so divides the stream that seldom any escapes. With the smaller ones we most commonly made them horizontally, beginning as near the top of the head as possible, and for this reason all the juices, if the first incision was made at the bottom, would be naturally attracted by the aperture, and render every other completely fruitless, besides occasioning the certain loss of a considerable quantity, by falling on the surrounding leaves; whereas, on the other hand, a proportion of milk will exude from each, and the Opium be equally distributed over the whole surface of the head.

No particular directions seem necessary for repeating this operation, any farther than that each time it should be performed in a contrary direction, and continued till no more will exude, at intervals of four or five days or more, according to circumstances: for, as the weather proves rainy or fair, they will be shorter or longer, the heads being sooner replenished in the one than the other.

Each of the children being provided with a tin cup, having one handle, so contrived as to fix itself to a girdle fastened round his waist, with a common gardening knife they scraped off the Opium that appeared upon the heads in a soft ash-coloured substance. Dewy mornings are best calculated for this purpose, and it should be discontinued so soon as the sun has gained a sufficient power to dissipate it; for, if persevered in throughout the day,

some of the Opium will recede into the interstices, and more, in defiance of every endeavour, will remain upon the heads. The principal quantity exudes in the course of the night, and, uniting with the dew, it is taken off as readily and as completely as with a sponge.

Several regulations were adopted to excite, as much as possible, a spirit of emulation. The name of each boy was written upon his cup, so as to ascertain, on their return from collecting, who had been the most active. And although, in consequence of the unsettled state of the weather, this part of our process continued so long as from the 6th of July to the second week in September inclusive, the good effects were felt to the last. And, as for the reason already mentioned, an hour in the morning became so invaluable, those who appeared in the ground at five o'clock, at the most busy period, became entitled to an additional penny to their daily pay. This measure succeeded at first only with a few; but the remainder, overcome by shame, at length attended equally well. In addition to this encouragement, I am under an engagement (in case I succeed with the Society), to such whose behaviour has been uniformly good, to celebrate the circumstance by a public dinner.

The interval from breakfast time to sun-set, if the weather assumed a settled appearance, was occupied by scarifying. And here I again felt the good effects of stimulating measures: certain places were allotted to particular children, according to their ability, so as to discover who scarified the most and the best; the superintendant occasionally following all of them, to observe whether any work was left unfinished, and, if there were any, to complete it. If, in our progress, any one proved refractory, which happened in more instances than one, rather than have recourse to severity, and for the sake of example, he was immediately discharged. I had numerous applications, and the first on the list always had the preference as his successor.

Upon the whole, considering it was the first attempt of the kind, every thing proceeded very regularly; and had the summer been propitious, notwithstanding my former disappointments, I should have had great cause for satisfaction. The largest quantity that my man, seven children, and myself, were able to procure in one morning, from five to nine o'clock, was one pound and a half; this happened when the dew was remarkably great, and succeeded one of the warmest days in the summer.

As my notes furnish me with no further particulars, I have very little

more to add. The Opium, when first collected, from its union with the dew, is much too soft to be so formed as the Society has received it.

To reduce it to a proper consistence, taking nature for our guide, it should be thinly spread in shallow dishes, and exposed, under glasses, to the rays of the sun. My opinion is, that Turkey Opium suffers considerably from the operation of fire; certain it is, that, with respect to its effluvia, it undergoes a complete alteration. I have covered it with its own leaves, thinking this a very convenient mode of package, and conceiving it to be important, in every new undertaking, by studying appearances, to yield to the general prejudices which naturally prevail in favour of the article to which we have been accustomed.

I have several times trespassed on the patience of the Society; on the present occasion I have again been seduced into prolixity. I hope they will receive the same apology now as before, knowing so well how acceptable every communication of this kind, though extended even to minuteness, is to the interested inquirer. To the utmost of my power I have complied with the requisition of the Society in Class 175, in describing the mode of cultivating the Poppies, and preparing my Opium; and, in doing this, I can truly say, that every thing which I have advanced is founded on the evidence of facts. I have been unwilling to indulge myself in mere speculation, being of opinion, that a paper of such a description as the present, would prove much more acceptable if confined to experiment alone.

Had it been necessary, I could have introduced a variety of quotations on this subject, describing the method of preparing Opium in other countries; but surely this would have been foreign to the subject. The information which the Society and the public require, is what really has and may be done, as related in this paper. This information does not consist of vague evidence, collected from accounts of doubtful veracity, and of course more calculated to mislead than instruct; on the contrary, I have closely adhered to what I conceived to be the principal intention of the Society; have related nothing but what I actually saw; have confined myself to a bare recital of circumstances; and have only occasionally ventured to make deductions.

I acknowledge, with heartfelt pleasure, the repeated honours with which the Society has distinguished me; am not without hope, that this additional proof of perseverance and exertion will also receive its approbation. With

the certificates, I have inclosed a very flattering letter from Dr. Woodville, author of Medical Botany. It in a great measure proves, that if the practicability of preparing this inestimable medicine in this kingdom can be established, the Opium itself possesses every quality that can be desired.

I remain, Sir, your most obedient servant,

THOMAS JONES.

SIR, I called yesterday morning to examine the Opium collected by you from the capsules of the White Poppy; and I have no doubt, from its taste, smell, colour, and purity, but that it is *more* powerful and efficacious than the *best* foreign Opium imported into this country.

The late Dr. Alston, when Professor of Botany and the Materia Medica in the University of Edinburgh, informed the public, more than sixty years ago (see Med. Essays, Vol. V), that the milky juice, drawn by him from the heads of the White Poppy, soon acquired the consistence of Opium, when its taste, smell, faculties, &c. were *the same* as those of that drug.

In the year 1791 I convinced myself of the truth of his assertion, by repeating his experiments, which I noticed the following year in my Medical Botany. Soon after this time I appropriated a part of the garden at the Small-pox Hospital for the growth of the Papaver Somniferum, from the green capsules of which were collected between two and three ounces of Opium, which was found to be *more efficacious* than that of the exotic, as appeared upon trials of it made by several of my medical friends. But the great trouble and length of time required for the collection of the juice, induced me at that time to think, that the manufacture of this valuable medicine in England, did not hold forth any prospect of commercial advantage. However, since I have seen the great quantity of it collected under your direction, I sincerely hope that the above opinion will prove to be unfounded, and congratulate you on your success.

Your obedient servant,

W. WOODVILLE.

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

I William Duncan, of Philpot-lane, in the city of London, chemist and druggist, do hereby certify, that I have examined twenty-one pounds

seven ounces of Opium, made by Mr. Thomas Jones, of Fish Street Hill, from Poppies grown on his plantation at Enfield; and I declare, that it appears to me to be as fine Opium as the best I have ever seen in the course of my experience, for upwards of thirty years: and I further declare, that the whole of the said twenty-one pounds seven ounces, is of equal quality with the five pounds sent herewith for the inspection of the said Society.

WILLIAM DUNCAN.

The Committee of the Society for the Encouragement of Arts, &c.

GENTLEMEN, agreeably to your request to the Physicians of St. George's Hospital, conveyed in a letter of the 5th of May last, I, as one of that body, return you the result of the trials made with the English Opium, in a few cases under my care. Then follow the cases.

If a larger quantity of the drug, whose virtues were to be determined by experience, had been sent, more trials would have been made; but I have no doubt that the same effects, and by at least as small a dose, would have been produced by it as by the best foreign Opium.

I have the honour to be, Gentlemen, your most obedient servant,

G. PEARSON.

To the Committee of the Society for the Encouragement of Arts, &c.

GENTLEMEN, agreeably to your request, we have tried the Opium you were so good as to send to the Hospital, and am sorry, in the short time in which you desired an answer, that we have had only one case to give it a fair trial, namely, Elizabeth Spraughton, who has been several weeks under the care of Dr. Vaughan with a diseased state of stomach, and in whom we suspect a schirrus of that viscus. She has been in the habit of taking one grain of Opium every four or six hours, according to the violence of pain which she suffered. On the sixth of May she began with your English Opium, made into pills of one grain each, and found as much relief as she used to do from the foreign Opium. She has continued taking them ever since, and with the same effect.

I remain, Gentlemen, your obedient humble servant,

G. E. LAWRENCE, Apothecary.

The Committee of Chemistry, to whose examination the English Opium, prepared by Mr. Jones, was referred by the Society, ordered samples of the

Opium to be left with several eminent chemists for their analysis and judgment; in consequence of which, the following preparations were laid before the Committee by those Gentlemen, viz.

Extract of English Opium in proof spirit.

Hard Extract of English Opium.

Watery extract of English Opium of the late Dispensatory.

Tincture of English Opium of the present Pharmacopœia.

Tincture of English Opium of the late Dispensatory.

English Opium powdered.

Similar preparations of fine foreign Opium were produced in comparison.

From the general result of these experiments it appears, that Mr. Jones's English Opium is equal in quality to fine foreign Opium; and the certainty of its growth in this country, preparation, and efficacy, fairly established.

The *Palma Christi*, or *Ricinus*, whence comes our Castor oil, the mildest purgative almost we possess, might most probably be naturalized to this climate. Dr. Woodville gives a plate of this plant, shewing its curious palmated leaf and flowers, taken from a fine plant flourishing in the garden of Dr. Saunders, at Highbury Terrace, Islington. The *American Palma Christi* rises with a strong herbaceous stalk to the height of ten or twelve feet; the joints are at a great distance from each other; the stalk and branches are of a grey colour; the leaves are large, and on long foot-stalks; they are deeply divided into seven lobes, and are grey on their under side. The flowers are disposed in long spikes, which spring from the division of the branches: the males are placed on the lower part of the spike; the females, which occupy the upper part, have prickly calyxes.

This plant, which in our gardens is annual and herbaceous, in Africa becomes a tree.* In Candia it continues many years, and according to Belon, requires a ladder to come at the seeds. Clusius relates, that he observed it in Spain, of the size of the human body, and the height of three men. And Ray saw it in Sicily, frequent in the hedges, as big as our common Elder trees, woody, and long-lived.†

The several varieties are natives of the East and West Indies, China,

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* Desfontaines. † Ray Hist

Cochinchina and Japan, about Tripoli in Syria; Africa, and the South of Europe.

It was cultivated in England in 1562, as appears from Turner's herbal. It flowers here in July and August, and should be forced by dung.

The *Ricinus* is called the *oil-nut* in our West Indian Islands, and the oil is used in the boiling-houses in lamps by many of the sugar planters.

Even if not cultivated here for medicinal purposes, it is a very *ornamental* plant, and would embellish the grounds about our habitations.

Let us proceed from medicinal to edible plants. The *Potatoe (Solanum Tuberosum)* now so generally cultivated in Europe, appeared at the end of the sixteenth century as a curiosity in Botanic Gardens. Gerarde in 1597 informs us, that he received roots of it from Virginia, which grew and prospered in his garden, as in their native country; he calls it Potatoe of America, from the Spanish name Battata. Though it is pretty clear that the Potatoe came to us from Virginia, yet it does not follow that it is originally indigenous to that country, but that it was probably a native of Peru, as the Spanish name indicates.

Clusius in 1631 gives a drawing of the whole plant in his History of *Rare Plants*, taken from one which he says was in his own possession.

Caspar Bauhin relates that the *Potatoe* came first from *Virginia* to *England*, and thence spread all over *Europe*.

In Gough's Edition of Camden's Britannia, it is expressly affirmed, that Sir Walter Raleigh, who was beheaded in 1618, first introduced this root into England from *Virginia* in 1584, having cultivated them at Youghall in the county of Cork.

From Ireland it quickly passed over to the continent.

The *Cucumber* is a native of the South of France.

The *Sugar Maple of America* (Acer Saccharinum) might also be naturalized to this climate. This tree will grow to the height of forty feet. It has some resemblance to that from Norway, when the plants are young; but as they grow up, the leaves of this are more deeply divided, and their surfaces less smooth, so that the two species are then easily distinguished.

This is very distinct from the scarlet-flowering Maple, in having the

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[a] Hort. Kew.

leaves divided more deeply and towards the base, veined also and of a sea-green colour underneath.*

The Flowers are apetalous, in pendulous racemes, short and compound, composed of imperfect bissexual and perfect male flowers, the anthers being abortive in the first, and fertile in the last. It was introduced here in 1735, by Peter Collinson, Esquire.†

From this tree the inhabitants of North America make a very good sort of sugar, in large quantities, by tapping the trees early in the spring, and boiling the juice. But I am of opinion that they make sugar from more than one sort of Maple in America; for I have found that the Ash-leaved Maple abounds with a saccharine juice, in full as great plenty as any other sort. Mr. Ray and Dr. Lister prepared a tolerably good sort of sugar from our Great Maple; and I have observed upon cutting off branches from the Scarlet Maple in February, a great quantity of a very sweet juice has flowed out for several days together. Large tracts in North America are covered with the Sugar Maple; this tree yields a Sugar equal to the best from the Cane, and in great quantity, with no other labour than what women and girls can bestow, in drawing off and boiling the liquor; and when skilfully tapped will last many years. It is therefore believed by judicious persons, that the country can not only supply their own demand, but even make Sugar for exportation.‡

The *Acer Saccharinum* of Linnæus, or the Sugar Maple-tree, grows in quantities in the western counties of all the Middle States of the American Union. Those which grow in New York and Pennsylvania yield the Sugar in a greater quantity than those which grow on the waters of the Ohio. These trees are generally found mixed with the Beech,[1] Hemlock,[2] White and water Ash,[3] the Cucumber tree,[4] Linden,[5] Aspen,[6] Butter Nut,[7] and Wild Cherry trees.[8] They sometimes appear in groves covering five or six acres in a body, but they are more commonly interspersed with some, or all of the forest trees which have been mentioned. From thirty to fifty trees

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* Lin. Spec. † Hort. Kew.

‡ Information from Thomas Jefferson, Esq. jun. 1790.

[1] Fagus Ferruginea. [2] Pinus abies. [3] Fraxinus Americana. [4] Magnolia acuminata. [5] Tilia Americana. [6] Populus tremula. [7] Juglans alba (oblonga.)

[8] Pranus Virginiana, of Linnæus.

are generally found upon an acre of ground. They grow only in the richest soils, and frequently in stony ground. Springs of the purest water abound in their neighbourhood. They are when fully grown as tall as the white and black oaks, and from two to three feet in diameter.* They put forth a beautiful white blossom in the Spring before they show a single leaf. The colour of the blossom distinguishes them from the *acer rubrum*, or the common maple, which affords a blossom of a red colour. The wood of the Sugar Maple-tree is extremely inflammable, and is preferred upon that account by hunters and surveyors for fire-wood. Its small branches are so much impregnated with sugar as to afford support to the cattle, horses, and sheep of the first settlers during the winter, before they are able to cultivate forage for that purpose. Its ashes afford a great quantity of pot ash, exceeded by few, or perhaps by none of the trees that grow in the woods of the United States.

The tree is supposed to arrive at its full growth in the woods in twenty years.

It is not injured by tapping; on the contrary, the oftener it is tapped, the more syrup is obtained from it. In this respect it follows a law of animal secretion. A single tree has not only survived, but flourished after *forty-two* tappings in the same number of years. The effects of a yearly discharge of sap from the tree in improving and increasing the sap, is demonstrated from the superior excellence of those trees which have been perforated in an hundred places, by a small wood-pecker which feeds upon the sap. The trees after having been wounded in this way, distil the remains of their juice on the ground, and afterwards acquire a black colour. The sap of these trees is much sweeter to the taste than that which is obtained from trees which have not been previously wounded, and it affords more sugar.

From twenty-three gallons and one quart of sap procured in twenty hours from only two of these dark coloured trees, Arthur Noble, Esq. of the state of New York, obtained four pounds and thirteen ounces of good grained sugar.

A tree of an ordinary size yields in a good season, from twenty to thirty

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* Baron La Hontan, in his voyage to North America, gives the following account of the Maple-tree in Canada. After describing the black Cherry-tree, some of which he says are as tall as the loftiest oaks, and as big as a hogshead, he adds, "The Maple-tree is much of the same height and bulk. It bears no resemblance to that sort we have in Europe."

gallons of sap, from which are made from five to six pounds of sugar. To this there are sometimes remarkable exceptions. Samuel Low, Esq. a Justice of Peace in Montgomery county, in the state of New York, informed Arthur Noble, Esq. that he had made twenty pounds and one ounce of sugar between the 14th and 23d of April, in the year 1789, from a single tree that had been tapped several successive years before.

From the influence which culture has upon forest and other trees, it has been supposed, that by transplanting the Sugar Maple tree into a garden, or by destroying such other trees as shelter it from the rays of the Sun, the quantity of the sap might be increased; and its quality much improved. I have heard of one fact which favours this opinion. A farmer in Northampton county in the state of Pennsylvania, planted a number of these trees above twenty years ago in his meadow, from *three* gallons of the sap of which he obtains every year a pound of sugar. It was remarked formerly that it required *five* or *six* gallons of the sap of the trees which grow in the woods, to produce the same quantity of sugar.

The sap distils from the *wood* of the trees. Trees which have been cut down in the winter for the support of the domestic animals of the new settlers, yield a considerable quantity of sap as soon as their trunks and limbs feel the rays of the Sun in the spring of the year.

It is in consequence of the sap of these trees being equally diffused through every part of them, that they live three years after they are *girdled*, that is, after a circular incision is made through the bark into the substance of the tree for the purpose of destroying it.

It is remarkable that grass thrives better under this tree in a meadow, than in a situation exposed to the constant action of the Sun.

The season for tapping the trees is in February, March, and April, according to the weather which occurs in these months.

Warm days and *frosty* nights are most favourable to a plentiful discharge of sap.* The quantity obtained in a day from a tree, is from five gallons to

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* The influence of the weather in increasing and lessening the discharge of the sap from trees is very remarkable.

Dr. Tongue supposed long ago (Philosophical Transactions, No. 68) that changes in the weather of every kind might be better ascertained by the discharges of sap from trees than by weather glasses. I have seen a journal of the effects of heat, cold, moisture, drought and thunder upon the discharges from the sugar trees, which disposes me to believe that there is some foundation for Dr. Tongue's opinion.

a pint, according to the greater or less heat of the air. Mr. Low informed Arthur Noble, Esq. that he obtained near three and twenty gallons of sap in one day (April 14, 1789), from the single tree which was before mentioned. Such instances of a profusion of sap in single trees are however not very common.

There is always a suspension of the discharge of sap in the night if a frost succeed a warm day. The perforation in the tree is made with an axe or an auger. The latter is preferred from experience of its advantages. The auger is introduced about three-quarters of an inch, and in an ascending direction (that the sap may not be frozen in a slow current in the mornings or evenings) and is afterwards deepened gradually to the extent of two inches. A spout is introduced about half an inch into the hole, made by this auger, and projects from three to twelve inches from the tree. The spout is generally made of the Sumach* or Elder,† which commonly grow in the neighbourhood of the sugar trees. The tree is first tapped on the *South* side; when the discharge of its sap begins to lessen, an opening is made on its *North* side, from which an increased discharge takes place. The sap flows from four to six weeks, according to the temperature of the weather. Troughs large enough to contain three or four gallons made of white pine, or white ash, or of dried water ash, aspen, linden, poplar, or common maple, are placed under the spout, to receive the sap, which is carried every day to a large receiver, made of either of the trees before mentioned. From this receiver it is conveyed, after being strained, to the boiler.

To preserve the sap from rain and impurities of all kinds, it is a good practice to cover the troughs with a concave board, with a hole in the middle of it.

It remains yet to be determined whether some artificial heat may be applied so as to increase the quantity and improve the quality of the sap. Mr. Noble informed me, that he saw a tree, under which a farmer had accidentally burnt some brush, which dropped a thick heavy syrup resembling molasses. This fact may probably lead to something useful hereafter.

During the remaining part of the spring months, as also in the Summer, and in the beginning of Autumn, the maple tree yields a thin sap, but not fit for the manufactory of sugar. It affords a pleasant drink in harvest, and

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* Rhus. † Sambucus canadensis.

has been used instead of rum, in some instances by those farmers in Connecticut, whose ancestors have left to them here, and there, a sugar maple tree, (probably to shade their cattle,) in all their fields. Mr. Bruce describes a drink of the same kind, prepared by the inhabitants of Egypt, by infusing the sugar cane in water, which he declares to be "the most refreshing drink in the world."*

There are three methods of reducing the sap to sugar.

1. By *freezing* it; this method has been tried for many years, by Mr. Obadiah Scott, a farmer in Lucerne county in this state, with great success. He says that one half of a given quantity of sap reduced in this way, is better than one-third of the same quantity reduced by boiling. If the frost should not be intense enough, to reduce the sap to the graining point, it may afterwards be exposed to the action of the fire for that purpose.

2. By *spontaneous evaporation.* The hollow stump of a maple-sugar tree, which had been cut down in the spring, and which was found sometime afterwards filled with sugar, first suggested this method of obtaining sugar to our farmers. So many circumstances of cold and dry weather, large and flat vessels, and above all so much time, are necessary to obtain sugar, by either of the above methods, that the most general method among our farmers is to obtain it,

3. By *boiling.* For this purpose the following facts which have been ascertained by many experiments, deserve attention.

1. The sooner the sap is boiled, after it is collected from the tree, the better. It should never be kept longer than twenty four hours, before it is put over the fire.

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* Baron La Hontan gives the following account of the sap of the sugar maple-tree, when used as a drink, and of the manner of obtaining it. "The tree yields a sap which has a much pleasanter taste than the best lemonade or cherry water, and makes the wholesomest drink in the world. This liquor is drawn by cutting the tree two inches deep in the wood, the cut being made sloping to the length of ten or twelve inches; at the lower end of this gash, a knife is thrust into the tree slopingly, so that the water runs along the cut or gash, as through a gutter and falls upon the knife, which has some vessels underneath to receive it. Some trees will yield five or six bottles of this water in a day, and some inhabitants of Canada might draw twenty hogsheads of it in one day, if they would thus cut and notch all the maple-trees of their respective plantations. The gash does no *harm to the tree.* Of this sap they make sugar and syrup, which is so valuable that there can be no better remedy for fortifying the stomach. It is but few of the inhabitants that have the patience to make them, for as common things are slighted, so there are scarce any body but children that give themselves the trouble of gashing these trees."

2. The larger the vessel in which the sap is boiled, the more sugar is obtained from it.

3. A copper vessel affords a sugar of a fairer colour than an iron vessel.

The sap flows into wooden troughs, from which it is carried and poured into stone troughs or large cisterns in the shape of a canoe, or large manger made of white ash, linden, bass wood, or white pine, from which it is conveyed to the kettle in which it is to be boiled. These cisterns, as well as the kettle, are generally covered by a shed to defend the sap from the rain. The sugar is improved by straining the sap through a blanket or cloth, either before or after it is half boiled. Butter, hog's lard, or tallow, are added to the sap in the kettle to prevent its boiling over; and lime, eggs, or new milk, are mixed with it in order to clarify it. I have seen clear sugar made without the addition of either of them. A spoonful of slack lime, the white of one egg, and a pint of new milk, are the usual proportions of these articles, which are mixed with fifteen gallons of sap. In some samples which I have lately seen of maple sugar clarified with each of the above articles, that, in which milk alone was used, had an evident superiority over the others in point of colour.

The sugar after being sufficiently boiled, is *grained* and *clayed*, and afterwards *refined*, or converted into loaf sugar. The methods of conducting each of these processes is so nearly the same with those which are used in the manufactory of West-Indian sugar, and are so generally known, that I need not spend any time in describing them.

It has been a subject of enquiry, whether the maple sugar might not be improved in its quality, and increased in its quantity, by the establishment of boiling houses in the sugar maple country to be conducted by *associated* labour. From the scattered situation of the trees, the difficulty of carrying the sap to a great distance, and from the many expenses which must accrue from supporting labourers and horses in the woods, in a season of the year in which nature affords no sustenance to man or beast, I am disposed to believe that the most productive method both in quantity and profit of obtaining this sugar will be by the labour of private families. For a great number of years many hundred private families in New-York and Pennsylvania have supplied themselves plentifully with this sugar during the whole year. I have heard of many families who have made from two to four hundred

pounds in a year; and of one man who sold six hundred pounds, all made with his own hands in one season.*

Not more knowledge is necessary for making this sugar than is required to make soap, cyder, beer, sour-crout, &c. and yet one or all of these are made in most of the farm houses of the United States. The kettles and other utensils of a farmer's kitchen, will serve most of the purposes of making sugar, and the time required for the labour, (if it deserves that name) is at a season when it is impossible for the farmer to employ himself in any species of agriculture. His wife and all his children above ten years of age, moreover, may assist him in this business, for the profit of the weakest of them is nearly equal to that of a man when hired for that purpose.

A comparative view of this sugar has been frequently made with the sugar which is obtained from the West India sugar cane, with respect to its *quality*, *price*, and the possible or probable *quantity* that can be made of it in the United States, each of which I shall consider in order.

1. The *quality* of this sugar is necessarily better than that which is made in the West-Indies. It is prepared in a season when not a single insect exists to feed upon it, or mix its excretions with it, and before a particle of dust or of the pollen of plants can float in the air. The same observation cannot be applied to the West-India sugar. The insects and worms which prey upon it, and of course mix with it, compose a page in a nomenclature of natural history. I shall say nothing of the hands which are employed in making sugar in the West-Indies, and indeed men who work for the exclusive benefit of others, are not under the same obligation to keep their persons clean while they are employed in this work, that men, women, and children are, who work exclusively for the benefit of *themselves*, and who have been educated in the habits of cleanliness. The superior purity of the maple sugar is farther proved by its leaving less sediment when dissolved in water, than the West-India sugar.

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* *The following receipts published by William Cooper, Esq. in the Albany Gazette, fully establishes this fact.*

"Received, Cooper's Town, April 30th, 1790, of William Cooper, sixteen pounds, for six hundred and forty pounds of sugar made with *my own hands*, without any assistance, in less than four weeks, besides attending to the other business of my farm, as providing fire wood, taking care of the cattle," &c. John Nicholls. Witness R. Smith.

A single family, consisting of a man and his two sons, on the maple sugar lands between the Delaware and Susquehannah, made eighteen hundred pounds of maple sugar in one season.

It has been supposed that the maple sugar is inferior to the West-India sugar in *strength*. The experiments which led to this opinion, I suspect have been inaccurate, or have been made with maple sugar, prepared in a slovenly manner. I have examined equal quantities, by weight, of both the grained and the loaf sugar, in hyson tea, and in coffee, made in every respect equal by the minutest circumstances that could affect the quality or taste of each of them, and could perceive no inferiority in the strength of the maple sugar. The liquors which decided this question were examined at the same time, by Alexander Hamilton, Esq. Secretary of the Treasury of the United States, Mr. Henry Drinker, and several Ladies, who all concurred in the above opinion.

2. Whoever considers that the gift of the sugar maple trees is from a benevolent Providence, that we have many millions of acres in our country covered with them, that the tree is improved by repeated tappings, and that the sugar is obtained by the frugal labour of a farmer's family, and at the same time considers the labour of cultivating the sugar cane, the capitals sunk in sugar works, the first cost of slaves and cattle, the expenses of provisions for both of them, and in some instances the additional expense of conveying the sugar to a market, in all the West-India Islands, will not hesitate in believing that the maple sugar may be manufactured much cheaper, and sold at a *less price* than that which is made in the West-Indies.

3. The resources for making a sufficient *quantity* of this sugar not only for the consumption of the United States, but for exportation, will appear from the following facts. There are in the states of New-York, and Pennsylvania alone at least ten millions of acres of land which produce the sugar maple-tree, in the proportion of thirty trees to one acre. Now, supposing all the persons capable of labour in a family to consist of three, and each person to attend 150 trees, and each tree to yield 5lbs. of sugar in a season, the product of the labour of 60,000 families would be 135,000,000 pounds of sugar, and allowing the inhabitants of the United States to compose 600,000 families, each of which consumed 200 pounds of sugar in a year, the whole consumption would be 120,000,000 pounds in a year, which would leave a balance of 15,000,000 pounds for exportation. Valuing the sugar at 6-90 of a dollar per pound, the sum saved to the United States would be 8,000,000 dollars by home consumption, and the sum gained by exportation would be

1,000,000 dollars. The only part of this calculation that will appear improbable is, the number of families supposed to be employed in the manufactory of the sugar; but the difficulty of admitting this supposition will vanish when we consider, that double that number of families are employed every year, in making cyder, the trouble, risks, and expenses of which are all much greater than those of making maple-sugar.

But the profit of the maple tree is not confined to its sugar. It affords a most agreeable molasses, and an excellent vinegar. The sap which is suitable for these purposes is obtained after the sap which affords the sugar has ceased to flow, so that the manufactories of these different products of the maple tree, by *succeeding*, do not interfere with each other. The molasses may be made to compose the basis of a pleasant summer beer.

A person who had been many years acquainted with the usual method of making this article, having obtained the instructions of a sugar refiner in Philadelphia, began his experiments in February 1790, at Stockport, on the river Delaware, and sent sugar to Philadelphia, equal in the opinion of good judges to the best sugars imported from the West-India islands. He is clearly of opinion that four active men, well provided with materials and conveniences, may turn out, in a common season, which lasts from four to six weeks, 40 cwt. of good sugar.

In all sugar plantations it will be advantageous to cut out the different sorts of timber which grow intermixed with the Maple-tree, and even such of that species as are not thriving trees. The timber so cut out will serve as fuel for the boilers, and leave openings for the rays of the sun to enter, which will improve and enrich the sap.*

The first account we have of this subject being adverted to in England is from the philosophical Letters of Mr. Ray, and others, published by W. Derham.

Dr. ROBINSON to Mr. RAY.

SIR, London, March 10, 1684.

I have enclosed some sugar of the first boiling got out of the juice of the wounded Maple. Mr. Ashton, our Secretary, gave it me for you; it was sent me from Canada, where the savages prepare it out of the

* From Dr. Rush's account of the Sugar Maple-tree, in Vol. III. of the American Transactions.

aforementioned liquor, eight pints whereof afford a pound of sugar. If you have any of these trees near you, or the Birch, or any other weeping trees, I wish you would make a trial, proceeding as in the juice of the sugar cane. The Indians of Canada have practised this time out of mind: the French begin now to refine it, and to make great advantages.

Mr. RAY to Dr. ROBINSON.

SIR, Black Notley, April 1, 1685.

A friend and neighbour apothecary, whom I employed yesterday, brought me the effect of his boiling the juice of the greater Maple. Having boiled as high as an extract, he found a whitish body somewhat like brown sugar, and tasting sweet; but withal of a woody relish, immersed in a body of the colour and consistency and taste too of molasses. Upon curing, I do not doubt we shall have, after the molasses are separated, a perfect sugar, but in very small quantity, not above an ounce from a gallon of liquor. Possibly, nay likely, afterwards, when the liquor begins to run thick near its ceasing, it will yield a greater proportion of sugar. When he hath cured it, I will give you a farther account of it.

The *European Lime Tree* (TILIA EUROPÆA) has great affinity with the Sugar Maple. It is produced all over Europe, and a smaller sort, RUBRA, (*the red twigged*) is found wild in England. It grows to an immense size, and attains a great age. Our St. James's Park* is ornamented with this stately, and when in blossom, fragrant tree.†

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* This Park was once a swamp, and we are indebted to Evelyn, who recommended to Charles II. the draining of it, and planting an avenue of these trees. The canal in the centre should be ornamented with the *Weeping Willow* (SALIX BABYLONICA) the Latin name from its being a native of *Babylon*, and on this tree the Jews, when in captivity, used to hang their harps. It excites sensations of pleasure, or of sorrow, as the soul is attuned to the one or the other. The source of all our *Willows* was from a famous tree of that kind in Pope's garden at Twickenham. In the St. James's Chronicle is this notice. "The famous and admired weeping willow, planted *first* by Pope, came originally from *Spain*, some branches of it having been put up as package of dried grapes, as a present to the late lady Suffolk. Mr. Pope was in company when the covering was taken off, and he observed, that the twigs appeared, as if they had some vegetation in them, and added, perhaps, they may take root and grow and produce *something we have not in England*. Under this idea, the principal branch was planted in his garden, and produced that very willow, which has since, by a similar process, given birth to so many others.

† The flowers of this tree are delightfully fragrant, especially in the evening; and this it was that probably caused the Dutch so much to plant this tree by the side of their canals. The whole country for miles is perfumed by these flowers during the months of July and August, at which time the stagnant waters would exhale a very noisome and hurtful odour.

Miller measured one which was near ten yards girth two feet above the ground, and was then in a thriving state: and Sir T. Brown mentions one, which grew in Norfolk, that was sixteen yards in circuit and one foot and a half above ground, in height thirty yards, and in the least part of the trunk it was eight yards and a half.

The wood is light, smooth, of a spongy texture, and does not easily bend.

It will grow if planted upside down, when the branches will become roots, and the roots put forth leaves.

The wood is used by carvers; and by architects for framing the models of their buildings; the turner makes light bowls, dishes, &c. it also serves for wainscotting rooms, but it is too soft for any strong purposes.

Is best suited for producing charcoal for gunpowder, and for designers. The twigs are fit for making large baskets.

In Norway the peasants form with the bark very elegant butter-baskets; likewise when macerated, lines for husbandry and for fishing; of the inner bark is made the bass-mats, so useful to gardeners.

The sap inspissated affords a quantity of sugar. The flowers are reckoned among the best for bees to collect honey from; and an artificial wax has been obtained from them by a chemical process.

The Birch (BETULA ALBA) is found extending from Lapland to the subalpine parts of Italy; also in Asia, chiefly in mountainous situations.—It may be known at first sight by the silvery colour of its bark, or rather Epidermis, the smallness of its leaves in comparison with other timber-trees, and the lightness and airiness of the whole appearance. Though Birch, says the excellent Evelyn, be of all other the worst of timber, yet has it various uses: as for the husbandman's ox-yokes; also for hoops, small screws, panniers, brooms, wands, bavin-bands, and wyths for faggots; and claims a memory for arrows, bolts, shafts (our old English artillery); also for dishes, bowls, ladles, and other domestic utensils, in the good old days of more simplicity, yet of better and truer hospitality. In New England our northern Americans make canoes, boxes, buckets, kettles, dishes, which they sew and join very curiously with thread made of Cedar roots; and divers other domestical utensils, as baskets, bags, with this tree, whereof they have a blacker * kind;

* B. nigra, n. 2.

and out of an excrescence or fungus from the bole, boiled, beaten and dried in an oven, they make excellent touchwood, and the best balls to play withal; and being reduced to powder, it is an infallible remedy in the hæmorrhoids. They make also not only this small ware, but even small craft, pinnaces of Birch, ribbing them with white Cedar, and covering them with large flakes of Birch-bark, sew them with thread of Spruce roots, and pitch them; as it seems we did even here in Britain, as well as the Veneti.* Also for fuel: in many of the mosses in the west riding of Yorkshire, are often dug up Birch-trees, that burn and flame like fir and candle-wood; Pliny says, the Gauls extracted a sort of bitumen out of Birch. Great and small coals are made by the charring of this wood; as of the tops and loppings Mr. Howard's new tan. The inner white cuticle and silken bark, which strips off of itself almost yearly, was anciently used for writing tables, before the invention of paper: and there is a Birch-tree in Canada, whose bark will serve to write on, and may be made into books, and of the twigs very pretty baskets. With the outward thicker and coarser part of the common Birch are divers houses in Russia, Poland, and those poor northern tracts covered, instead of slates and tile; nay in Sweden, the poor people grind the very bark, to mingle with their bread-corn. It is affirmed by Cardan, that some Birch-roots are so very extravagantly veined, as to represent the shapes of beasts, birds, trees, &c. Of the whitest part of the old wood, found commonly in *doating* Birches, is made the ground of our *effeminate farined Gallant's sweet powder*; and of the quite consumed and rotten, is gotten the best mould for the raising of divers seedlings of the rarest plants and flowers; to say nothing here of the magisterial fasces, for which anciently the cudgels were used by Lictors, for lighter faults, as now the gentler rods by our tyrannical pedagogues."†

To this ample, and in some parts quaint account by our venerable planter, we may properly add the information of more modern times.

The wood of our *Birch* is very white: women's shoe-heels and pattens, and packing cases are made of it. It is planted along with Hazel, to make charcoal for forges. In the northern parts of Lancashire they make a great quantity of besoms with the twigs for exportation.‡

The bark is of great use in dying wool yellow, and particularly in fixing

* Lucan's Pharsalia. † Silva edit. 4. 1706. fol. B. 1. c. 17. p. 89. ‡ Withering.

fugacious colours. For this purpose it is best to use it dry, and to disbark trees of eighteen or twenty years growth, at the time when the sap is flowing. The trees should stand, and be cut down the following winter. The *Black* American Birch may be applied equally well to the same purpose.*

The Highlanders of Scotland use the bark for tanning leather, and for making ropes; and sometimes they burn the outer rind instead of candles. With the fragments dexterously braided, the Laplanders make themselves shoes and baskets; they use large thick pieces set out, with a hole in the middle to fit the neck, for a surtout to keep off the rain. The Russians, Poles, and Norwegians, cover their houses with it, laying turf three or four inches thick over. In Kamtschatka they make hats and drinking cups of it.

The wood was formerly used by the Scotch Highlanders for their arrows; but now by the wheelwright, and for most rustic implements; by the turner for trenchers, bowls, ladles, &c. and when of a proper size it will make tolerable gates, rails, &c. In France it is generally used for wooden shoes. It affords good fuel, some of the best charcoal; and the soot is a good lamp-black for printer's ink. The small branches serve the Highlanders for hurdles, and side fences to their houses. Moxa is made of the yellow fungous excrescences of the wood, which sometimes swell out from the fissures. The leaves afford good fodder to horses, kine, sheep, and goats. The seeds are the favourite food of the Siskin or Aberdevine; and this tree furnishes food to a variety of insects.

The vernal sap of the Birch tree is well known to have a saccharine quality, and to make a wholesome diuretic wine. In the beginning of March, while the sap is rising, and before the leaves shoot out, bore holes in the bodies of larger trees, and put fossets therein made of Elder sticks with the pith taken out, setting vessels under to receive the liquor. If the tree be large, you may tap it in four or five places at a time; and thus from several trees you may draw several gallons of juice in a day. If you do not get enough in one day, bottle up close what you have, till you get sufficient for your purpose, but the sooner it is boiled the better. Boil the sap as long as any scum rises, skimming it all the time. To every gallon of liquor put four pounds of sugar, and boil it afterwards half an hour, skimming it well;

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* Dambourney.

then put it into an open tub to cool, and when cold turn it into the cask; when it has done working, bung it up close, and keep it three months; then either bottle it off, or draw it out of the cask when it is a year old.*

The Birch, says our ancient Gerard, serveth well to the decking up of houses and banquetting rooms, and for beautifying of streets in the Crosse or Gangweek, and such like.

If this tree serves such purposes no longer, it deserves however to be planted in parks and ornamental woods, to increase the variety; and its fragrant smell after rain justly entitles it to a place in the wilderness.† The stem being straight, the bark smooth and white, and the foliage neat, the Birch has a picturesque appearance when properly placed in ornamental plantations; either in the openings here and there, to show the foliage and hanging down of the twigs, or within to display its silvery bark through the gloom.‡

But from what has been said, the Birch, though in the lowest esteem as a timber tree, may yet deserve to be cultivated, not merely as an ornament, but for its various uses; especially when it will grow to advantage upon the barren land, where better trees will not thrive: it will flourish in moist springy land, or in dry gravel and sand, where there is but little surface: upon ground which produced nothing but moss, these trees have succeeded so well as to be fit to cut in ten years after planting, when they have been sold for near ten pounds the acre standing, and the after produce has been considerably increased; and as the woods near London have been grubbed up, the value of these plantations has advanced in proportion: therefore those persons who are possessed of such poor land, cannot employ it better, than by planting it with these trees, especially as the expense of doing it is not great.

The leaves of the *Canada Birch* are smooth, very finely and sharply serrate. The female catkins are ovate, sessile, with acuminate entire § scales. It grows sixty feet and more in height. The liquor flowing from its wounds is used by the inhabitants of Kamtschatka without previous fermentation; with the wood they build sledges and canoes; and they convert the bark into food by stripping it off when green, and cutting it into long narrow pieces, like Vermicelli, drying it, and strewing it with their Caviar.‖ It was cultivated in 1759, by Mr. Miller.¶

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* Lightfoot. † Boucher. ‡ Gilpin's for. scen. i. 66. § Linn. ‖ Hunter. ¶ Hort. Kew.

East Indian-Corn (Holcus Saccharatus). Its country is marked by its English name. The culture is by seed, which is to be sown on a warm border in April.

The plant when up is to be thinned to the distance of a foot asunder in the rows, and the rows three feet distant, to be kept clear of weeds, and the earth drawn up to the stems.

It does not ripen its seeds, but in a favourable season, and that in September.

Perhaps an hardier variety than any yet tried might be produced from abroad, or with care raised by means of seeds in this country.

The grain is made into bread, or otherwise used, and is esteemed extremely wholesome. Poultry fatten remarkably well on it. The juice of the stalk is so agreeably luscious, that if prepared as the Sugar-canes they might be made to afford an excellent sugar.

The Millet (Holcus Sorghum) nearly resembles the last. Miller describes the Sorghum and saccharatus together, and indeed they differ so little as scarcely to merit being considered as distinct species. According to him the stalks of these plants rise five or six feet high, are strong, reedy, and like those of the Maiz, or Turkey wheat, but smaller. The leaves are long and broad, having a deep furrow through the centre, where the midrib is depressed on the upper surface, and is very prominent below. The leaves are two feet and a half long, and two inches broad in the middle, embracing the stalks with their base. The flowers come out in large panicles at the top of the stalks, resembling, at first appearance, the male spikes of the Turkey wheat; these are succeeded by large roundish seeds, which are wrapped round with the chaff.

They are both natives of India, where this grain is much used to feed poultry, and is frequently sent to Europe for the same purpose. This is much cultivated in Arabia, and most parts of Asia Minor. It has been introduced into Italy, Spain, Switzerland, and some parts of Germany; also into China, Cochinchina, and the West Indies, where it grows commonly five or six feet high, or more, and being esteemed a hearty food for labourers, is called Negro Guinea Corn. Its long awns or bristles defend it from the birds.* In England, the autumns are seldom dry and warm enough to ripen the seed in the field. Habit might alter its nature.

* Browne.

Indian Corn (ZEA MAYS) of which there are four kinds.

1. India Maize grows eight or ten feet high; the ears before they are quite ripe, are eaten, roasted.

2. Portugal Maize. This grows also in Spain and Italy. These two are cultivated in our gardens, more for curiosity than use; and are sown on a moderate hot-bed in March or April, and transplanted into the open ground in May.

3. German Maize. This has been cultivated in the field, both in England and Ireland, with success.

4. North American Maize. The Americans cultivate five or six sorts, which grow of different heights. A short kind, called Mohawks-Corn, ripens its seed in the more northern parts, though sown so late as June.

The American seed varies very much in colour, and that not only in the same field, but in the same ear: this may be prevented, by sowing only one colour, at a good distance from fields containing another coloured corn.

The first of these grows naturally in the islands of the West Indies; and has a very large strong stalk, rising the height of about ten or twelve feet. The leaves are long, broad, hang downward, and have a broad white midrib. The male flowers come out in the branching spikes at the upper part of the stalks; these are eight or ten inches long. The female flowers come out from the bottom of the leaves on the side of the stalk; they are disposed in a close long thin spike, and are covered closely with thin spathes or sheaths; out of the end of these covers hangs a small long bunch of threads. When the seeds are ripe, the spikes or ears are nine or ten inches long, and sometimes a foot; but these rarely ripen in England.

Mr. Miller says he has not seen any variety of colours in this, but that it is very probable there are the same varieties in the grain as in the others. This being less common in Europe, we are not so well acquainted with it.

The second is cultivated in Italy, Spain, and Portugal. The stalks are more slender, and seldom more than six or seven feet high. The leaves are narrower, and hollowed like the keel of a boat, and their tops hang downwards. The spikes of male flowers are shorter, and the ears of grain are slenderer, and not more than six or seven inches long. The grain does not come to maturity in England, unless the season prove very warm, and it is sown early in a warm soil and situation.

The third is cultivated in North America and Germany. The stalks are slender, and seldom rise more than four feet high. The leaves are shorter and narrower than either of the former; they are hollowed like the keel of a boat, and their tops hang down. The spikes of male flowers are short, and the ears of grain are seldom more than five or six inches long. This ripens its grain perfectly well in England, in as little time as Barley.

There are several varieties of the two last, differing in the colour of the grain. The most common colour is a yellowish white; but there are some with deep yellow, others with purple, and some with blue grains; and when the different colours are planted near each other, the farina will mix, and the ears will have grains of several colours intermixed on the same spike; but when the grains of the different varieties are planted at a proper distance from each other, the produce will be the same with the grains which are sown. From long experience, says Mr. Miller, I can affirm, that these three are different, and do not alter by culture.

In North America it is treated in the following manner. They first dig the ground well in the spring, and having made it level, they draw a line across the whole piece; then they raise little hills at about three or four feet distance, into each of which they put two or three good seeds, covering them about an inch thick with earth. The rows are four feet asunder, and the hills three or four feet distant from each other. Six quarts of seed are allowed to an acre, which, if the soil be good, will produce fifty bushels of corn.

There is nothing more observed in the culture of this grain, but only to keep it clear from weeds, by frequent hoeing the ground; and when the stems are advanced, to draw the earth up in a hill about each plant, which, if done, will greatly strengthen them, and preserve the ground about their roots moist for a considerable time.

When the corn is ripe they cut off the stalks close to the ground, and after having gathered the spikes of grain, they spread the stalks in the sun to harden and dry, which they afterward use in the same manner as reeds in England for making fences, covering sheds, &c. for which purpose they are very useful to the inhabitants of warm countries; and when there is a scarcity of forage, they feed their cattle with them green, as fast as the corn is gathered off.

The corn is ground to flour, and the poorest sort of people in America,

and also in Italy and Germany, make their bread of this flour; and in many of the warmest countries, the inhabitants roast the whole spikes, and dress them many different ways, making several dishes of them; but this grain seldom agrees with those who have not been accustomed to eat it; however, in times of scarcity of other grain, this would be a better substitute for the poor than bean flour, or other sorts, which have been used in England; and at all times will be found a hearty food for cattle, hogs, and poultry; so that in light sandy lands, where beans succeed not well, this grain may be cultivated to answer both purposes to advantage.

If this grain is cultivated by the horse-hoeing husbandry, it may be done at less expense than in any other method; for this is one of the plants which are more particularly adapted to this husbandry; therefore I shall here give an account of the method in which it has been cultivated by the horse-hoe, and has succeeded beyond expectation.

The land was very light and sandy, and far from being rich; this was ploughed deep before winter, and laid up in high ridges till the spring, when it was well harrowed to break it fine, and the beginning of April the ground was again ploughed, laid level, and well harrowed to make the surface smooth; then the seeds were sown in drills, which were made four feet asunder, into which the seeds were dropped at about a foot distance. When the plants were come up three inches high, where any of them were too close, they were cut up with a hand hoe, and the intervals between the rows were ploughed shallow, to destroy the young weeds. But when the stems were advanced, the ground in the intervals was ploughed deeper, and the earth laid up to the plants on both sides; and when the weeds began to grow again, the ground was a third time ploughed to destroy them; this kept the ground pretty clean from weeds till the grain was ripe, as the season was not wet, but otherwise it would have required a fourth ploughing to answer this purpose. The stalks of these plants produced from three to six spikes of grain each, which was a great increase.

Miller thinks that the Maize might be cultivated in England to great advantage. An Agricultural Society has been lately established at Margate, for the express purpose of *growing Indian Corn*; and it appears that some plants have been produced in that neighbourhood, equal to what has been seen to grow in America, or the West Indies.

Guinea Grass, so called from its having been originally introduced into the West Indies from the coast of Africa, is a species of *Holcus*, according to Browne.* The characters of it, he says, however agree pretty well with those of *Panicum*, in general, but the flowers commonly grow very luxuriant, and though often hermaphrodite, are generally observed to be male and female distinct, surrounded by separate involucres, and standing on distinct pedicles within the same calyx.

The blades of this grass, when flourishing, appear not unlike those of Wheat, only rather broader and longer; and the stalks, during the first growth, are also much like those of Wheat, but they get weaker and less, the oftener the grass is fed upon or cut, till at last it becomes a fine, rich and entire swath.

Guinea Grass appears capable of thriving in any situation, in respect to climate and soil, and can bear the effects of dry or wet weather in a most remarkable manner.

In wet weather it may be cut once in a fortnight, and sometimes oftener, when the land is new or fertile. In dry weather, it is long before it withers, and when reduced to such a state as to seem totally destroyed, will revive with a slight shower in a few hours: when rain falls, though so sparingly as to be of little or no service to common pastures, it will occasion this to be fit for use in a few weeks; nay in some situations, not too much exposed to the sun, it will flourish from occasional dews only. When ready to feed, it is from eight to six feet high, but it is generally fed or cut when only three or four.

It agrees with all kinds of stock; and horses, mules, and kine, will fatten so fast upon it, that the two former will be in good condition in a couple of months, or less: and the latter will become fit for the butcher in the course of three months.†

Guinea Grass is said to have been brought from Africa to America by the English at the beginning of the present century; and the French have introduced it thence into St. Domingo, &c. about the year 1768. It has made its way in the Continent of North America from Carolina to New England; and attempts have been made to introduce it into Europe. In

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* Jamica, p. 366. Species 2.

† Spooner in Bath Papers, Vol. V. 382.

Jamaica it is now generally cultivated to supply both their stabled and working cattle: and Sir Archibald Campbell, who was governor of that island, carried the seed to the East Indies, where it was propagated with success, and was of great service to the cavalry; the horses having been before that fed on the roots of grass.*

From the mildness of the winters in Cornwall and Devonshire, and myrtles growing every where in the open air, without the aid of green houses; the President of the Board of Agriculture has very properly recommended, from these circumstances, the trial of the Guinea Grass, to the inhabitants of Cornwall and Devonshire.

The Guinea Grass is considered in Jamaica next the sugar-cane, in point of importance; the breeding farms throughout the island were originally created, and are still supported, chiefly by means of this invaluable herbage; which bestows verdure and fertility on lands, which otherwise would not be worth cultivation. The seed was first brought from the coast of Guinea to Jamaica, as food for some curious birds, who died before they had consumed the whole; the remaining seed was thrown into a pen or fold, where they sprang up; and the eagerness with which the cattle were observed to eat the grass, led to its being cultivated.

They have, in Jamaica, another grass, called *Scot's-grass*; it is an aquatic plant, rises to five or six feet in height, with long succulent joints, and is of a very quick vegetation. From a single acre of this plant, five horses may be maintained a whole year, allowing fifty-six pounds a day to each.

Rice (Oriza). This plant, although a grass, is thought to produce a floret with *six* stamina. Aymen observes "Is not each flower of the Rice in fact composed of two florets?" The culm is pointed and rises to six feet in height. The native place of Rice, like the other Gramina, used as common food is unknown. Linnæus, indeed, says "habitat forte Æthiopia," but I do not know what authority he has for this assertion.

Rice is cultivated in great abundance all over India, where the country will admit of being flooded; also in the southern provinces of China; in Cochinchina, Cambodia, Siam, Japan, &c. In Japan it is very white and of the best quality.

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* Young's Annals, 9. 409. & 13. 341.

It has also been introduced into cultivation in the southern kingdoms of Europe, Italy, Spain, the South of France, and within a few years into Hungary.

In Carolina it has long been a staple commodity. Mr. Houghton's account of its introduction there is, that Mr. Ashby was encouraged to send a hundred pound-bags full of Rice to that province, from which in 1698, sixty tons were imported into England.*

Mr. Dalrymple says, that Rice in Carolina is the result of a small bag of Paddy, given as a present from Mr. Dubois, treasurer of the East India Company, to a Carolina trader. A Dutch vessel also from Madagascar brought Rice into the same province; and to that is attributed their having two kinds.†

Mr. Miller cultivated it here in 1739:‡ but Gerarde had it long before, for he says "the flower did not show itself with me, by reason of the injury of our unseasonable year 1596." In his time stoves were unknown.

In the hilly parts of Java, and in many of the Eastern Islands, the Mountain Rice is planted upon the sides of hills, where no water but rain can come; it is however planted in the beginning of the rainy season, and reaped in the beginning of the dry season. The natives call it *Paddy Gunung*, which signifies Mountain Rice. In the western parts of India it is entirely unknown.§

It is very general in Cochinchina, where it thrives in dry light soils mostly on the sides of hills, not requiring more moisture than the usual rains and dews supply, neither of which is frequent at the season of its vegetation.‖

The French colonies are indebted to M. Poivre for introducing this dry rice into Cochinchina.¶

Propagation and Culture in China.

Much of the low grounds in the middle and southern provinces of China is appropriated to the culture of Rice; which constitutes the principal part of the food of all those who are not so indigent as to be forced to

* Collections, 2. 461. † Oriental Repertory, 1. ‡ Hort. Kew.
§ Cook's Voy. 2. 732. ‖ Staunton's Emb. to China, 1. 349.
¶ Rochon, Madag. Introd. p. 45.

subsist on cheaper kinds of grain. A great proportion of the surface of the country is well adapted to the production of Rice. Many and great rivers run through the several provinces of China; the low grounds bordering on those rivers are annually inundated, by which means a rich mud or mucilage is brought upon their surface, which fertilizes the soil, in the same manner as Egypt is by the overflowing of the Nile.

After the mud has lain some days, preparations are made for planting Rice. For this purpose, a small spot of ground is inclosed by a bank of clay; the earth is ploughed up; and an upright harrow with a row of wooden pins in the lower end, is drawn lightly over it by a buffalo. The grain, previously steeped in dung diluted with animal water, is then sown very quickly on it. A thin sheet of water is immediately brought over it, either by channels leading to the spot from a source above it, or when below it, by means of a chain-pump, the use of which is as familiar as that of a hoe to every Chinese husbandman. In a few days the shoots appear above the water. In that interval, the remainder of the ground intended for cultivation, if stiff, is ploughed, the lumps broken by hoes, and the surface levelled by the harrow. As soon as the shoots have attained the height of six or seven inches, they are plucked up by the roots, the tops of the blades cut off, and each root is planted separately, sometimes in small furrows turned with the plough, and sometimes in holes made in rows by a drilling stick for that purpose. The roots are about a foot asunder. Water is brought over them a second time, for the convenience of irrigation, and to regulate its proportion. The Rice fields are subdivided by narrow ridges of clay into small inclosures. Through a channel in each ridge the water is conveyed at will to every subdivision. As the Rice approaches to maturity, the water, by evaporation and absorption, disappears entirely; and the crop, when ripe, covers the dry ground. The first harvest in the southern provinces particularly, happens towards the end of May or beginning of June.

The instrument for reaping is a small toothed sickle. The sheaves are placed regularly in frames, two of which suspended at the extremities of a bamboo pole are carried across the shoulders of a man to the place where it is to be threshed. This operation is performed not only by a flail, or by the treading of cattle, but sometimes also by striking it against a plank set upon its edge, or by beating it against the side of a large tub scolloped for that

purpose; the back and sides being much higher than the front, to prevent the grain from being dispersed. After being winnowed it is carried to the granary.

To remove the skin or husk of Rice, a large strong earthen vessel, or hollow stone, in form somewhat like that which is used elsewhere for filtering water, is fixed firmly in the ground, and the grain, placed in it, is struck with a conical stone fixed to the extremity of a lever, and cleared, sometimes indeed imperfectly, from the husk. The same object is attained by passing the grain between two flat stones of a circular form, the upper of which turns round upon the other, but at such a distance from it as not to break the grain. The operation is performed on a larger scale, in mills turned by water; the axis of the wheel carrying several arms, which raise levers by striking upon the ends of them. Sometimes twenty of these levers are worked at once. The straw is cut chiefly into chaff, to serve as provender for the very few cattle employed in Chinese husbandry.

The labour of the first crop being finished, the ground is immediately prepared for the reception of fresh seeds. The first operation is to pull up the stubble, collect it into small heaps, burn it, and scatter the ashes upon the field. The former processes are afterwards renewed. The second crop is generally ripe late in October, or early in November. The grain is treated as before; but the stubble is no longer burnt. It is turned under with the plough and left to putrefy in the earth. This, with the slime brought upon the ground by inundation, are the only manures usually employed in the culture of Rice. Lands thus fertilized by the overflowing of the tide in the proximity of the sea, or of rivers or canals, are not appropriate solely to the production of Rice. They are found equally suitable for raising an excellent crop of sugar canes, with the precaution only of keeping off the water after the young canes appear above the surface.

Satisfied with two crops of Rice, or one of Sugar in the year, the Chinese husbandman generally suffers the land to remain at rest till the following spring, when the same process is repeated. And thus from generation to generation, successive crops are raised from the same soil, without the least idea of any necessity to let the earth lie fallow or idle for a year.*

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* Staunton, Emb. to China, 2. 392 to 397. See Thumberg's Travels, 4, 85, 3, 148.

The result of some experiments to cultivate Indian dry or mountain Rice, was, that it will not produce grain in this climate; but as the quantity of the blade was uncommonly great, it is not impossible that it might be advantageous to sow it as food for cattle; for a very large proportion of stock might certainly be maintained upon an acre of it.

Though the dry Rice did not succeed, perhaps, better success would attend an attempt, to cultivate in England the Spanish marsh Rice. Ellis, in his voyage to Hudson's bay, mentions a kind of wild Rice growing in abundance, near our settlements, by the sides of lakes, and rivers; which if cultivated would make good food.

The *Yam* (Dioscorea).—Of this tribe, there are several species, one of which is called *sativa*, but it is the *alata*, which rather deserves that name as it is universally cultivated in the East and West Indies, in Africa, and in all the islands of the Southern ocean, within the torrid Zone, and even as far as New Zealand. The roots are frequently three feet long, and weigh thirty pounds. In all the islands of the South Sea, this Yam is known by the Malay name *Ufi* or *Ubi*. The Portuguese call this root *Inhame*, hence the French *Igname*, and our *Yam*.

It was cultivated here in 1739, by Mr. Miller.*

The Yam is largely propagated for food in Africa and the East and West Indies, especially in the latter for the negroes. The roots grow to a great size, are mealy, and esteemed to be easy of digestion; they are palatable, and not inferior to any roots now in use, either for delicacy of flavour or nutriment. They are eaten instead of bread, either roasted on the embers or boiled; the flower is also made into bread and puddings.

In Otaheite they make a dish which they esteem very delicious, from the roots of the Yam, with the kernel of the Cocoa-nut scraped, and the pulp of the Musa or Banana. The juice of Yam roots fresh is acrid, and excites an itching on the skin. There are many varieties of these roots, some spreading out like the fingers (Rumph. t. 121.), others twisted like a serpent (Rumph. t. 122.), others again very small, scarcely weighing more than a pound, with a whitish ash-coloured centre, whereas the bark is commonly black. The flesh of the Yam is white or purplish, and viscid, but becomes farinaceous or mealy when dressed. The varieties abovementioned

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* Hort. Kew.

occurred to our circumnavigators at the island of Otaheite, and belong rather to the fifth species; there are doubtless many varieties of a plant so generally cultivated.*

In a book entitled Gleanings from Books in Agriculture, p. 426, we have the following account.

West India Yam (Dioscorea Alata) will grow in the open ground in England.

These thrive on poor soil, even more abundantly than rich, (where they are apt to run too much to stem, and to be less productive at the root) and from the constant verdure which they retain to the latest period of the season, they enrich the ground little less than a crop of turneps itself. The Yam is cultivated in most parts in Scotland, and in North Wales.

Are treated in cultivation like potatoes; and, similar to them, are also excellent preparations for a wheat crop.

Are very productive; from twelve to twenty tons an acre is a common return of the red; the white is a finer species; but a less luxuriant crop.

The time of planting the end of May or beginning of June; are taken up in October or November, and housed, or laid up in pits like potatoes.

Chiefly for milch cows, increasing the produce, without affecting the quality or taste of the milk. As cattle eat them with the greatest voracity, there is a danger attending them, if given in large quantities: hence cows are never allowed above half a peck at a time; but this quantity may be repeated twice, or thrice a day, if care be taken to allow a considerable interval between each feed. In the West Indies are given to Mules.

The white Yam eats tolerably well at table. In the West Indies it is used to thicken soups.

The *Cauliflower* (Brassica oleracca botrytis varietas. 1.) was brought first to England from the island of *Cyprus*, where it is to be met with in great perfection. It was a great rarity till the year 1680, as were the purple and white *Broccoli*, which are only varieties of the Cauliflower, at least never came to market. From the year 1700, it has been greatly improved, and since common; for as my grandmother, æt. 92, informs me,

* Forster Escul. p. 57.

she remembers it, in her time, as a great rarity. By means of a small *hand-glass* they are brought to great perfection; and Holland is at this time supplied with them from England.

The Cauliflower has been, we know, introduced into Germany only a few years back.

The *Lettuce* (LACTUCA) from whose *milk* as good an opium may be extracted, when just in flower, as from the poppy,* is like the Broccoli, probably

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* The thanks of the Society were voted to the Rev. Edmund Cartwright, of Mary-le-Bone, for the following communication upon the production of Opium from Lettuces.

SIR,

Having lately made a discovery which I have reason to think may in the event lead to consequences of importance, whether considered as an object of science connected with the medical art, or of political economy in influencing an article of commerce, I feel it incumbent upon me to lay it before a Society with whose views it coincides, and to which, from a variety of personal motives, I am zealously attached.

Happening, some time in the month of August last, to read an account of the process for obtaining Opium from Poppies, I was led to consider the very peculiar nature of the substance which constitutes that most powerful drug.

On turning over the subject in my mind, the different varieties of the lactiferous plants naturally presented themselves to my recollection. From the uniformity which nature invariably observes in her operations, it seemed reasonable to conclude that the milky juice would, in regard to its prevailing property, be alike in all the different kinds of plants from which it is to be obtained; though perhaps more or less narcotic, and probably more or less deleterious, according to the specific quality of the particular plant which might yield it.

There being at that time in my garden a bed of lettuces running to seed (in which state they are known to be more particularly lactiferous), I collected a small quantity of the milky juice; and in a day or two, when it was sufficiently inspissated to admit of taking a solid form, I carried it, amounting to about six grains, to my friend Dr. George Pearson, requesting he would bring its properties, in any way he thought most satisfactory, to the test of experiment. The Doctor has since favoured me with the following letter on the subject.

DEAR SIR,

According to your request, I have the pleasure of sending you an account of the effects of the dried milky juice of Lettuce-stalks, in the instance which fell under my observation. This instance was John Sheppy, aged nineteen years, who had been ill with what is called the chronic rheumatism about two months, so as to be confined to his chair and bed. He had regularly slept every night from about nine to twelve o'clock; had been uniformly awaked by considerable pains of his limbs, especially of the elbows, and passed the remainder of the night in a sleepless state.

The sufferer had taken, for several nights preceding the exhibition of the dried Lettuce juice, a scruple in weight of Dover's powder without any relief: and, in place of this medicine, I administered the six grains of dried Lettuce juice at nine o'clock. The consequence was, that in twenty minutes he fell asleep, and slept all night soundly till four in the morning, and a great part of the day following. The next night he also had but slight pain, till the third night, when as usual the paroxism of suffering returned at midnight. The day after the taking this medicine, the patient was affected with head-ache, and felt a little numbness. He had three evacuations by stool the day following.

On the fourth night after the Lettuce juice had been given, he swallowed one grain of solid Opium, but without any subsequent relief.

On the fifth night *three* grains of solid Opium were given, but still he had a recurrence of pain at night, and passed a restless night, although not so bad as usual; nor by a repetition of opium

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a child of culture, the wild kind being scarcely edible. The first printed authority we have for the cultivation of this plant forming a delightful salad, is that of Turner in 1562. The names of the present numerous varieties point out whence the seeds or plants were obtained, as the Egyptian, Green Cos, the Versailles, the Cilicia, Brown Dutch, Green Capuchin, Red Capuchin, Roman Aleppo; not that we are to suppose all these were so derived exactly as the different appellations express.

Perhaps there is nothing that can evince more the power of art over nature, than the *Turnep* (Brassica Rapa), which in its wild state is an unprofitable weed. Pliny among the ancients, and Tragus among the moderns, speak of Turnep roots as weighing each forty pounds; Amatus of some amounting to fifty, or sixty; and Matthiolus of many exceeding fifty pounds, and some approaching to an hundred. The greatest weight I am acquainted with, says Professor Martyn, in England is thirty-six pounds. At Stowe, in Gloucestershire, a farmer produced four turneps weighing one hundred weight, and offered to produce, from a small given space, eighty turneps which should weigh a ton. It is not many years since the practice of sowing turneps for *cattle* has been of general use. How it happened, that this advance in agriculture should have been so long neglected in England and every part of Europe is a matter of surprise, since Columella in speaking of

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could the case be effectually relieved. But it was at last cured by frictions with mercurial ointment.

The preceding trial, I apprehend, shews, as decidedly as a single case can do, that the efficacy of dried Lettuce juice, as an *anodyne*, is at least equal to the dried poppy juice, commonly called Opium, if given in adequate doses.

Yours, &c.

G. Pearson.

If it should be found on subsequent trials, that the milky juice of Lettuce possesses, as possibly it may do, all the valuable properties of the common Opium, Lettuces may become an important article of culture for the sake of their milky juice only. But the cultivation of Lettuces has this further advantage over that of poppies,—after having yielded what milky juice can be obtained from them, Lettuces afford very wholesome and nutritious food for cattle, especially hogs, which are known to be remarkably fond of them.

There have not been wanting instances, as I have been informed, of Lettuces having been sown purposely to be given to hogs, particularly when first weaned.

Edmund Cartwright.

April 10, 1801.

Mr. Charles Taylor.

Since writing the above, I find a similar discovery has recently been made in America, the particulars of which are detailed in the last volume of the Transactions of the American Philosophical Society just published. The experiments that were there tried corroborate the one made by Dr. Pearson.

the several kinds of vegetables proper for the field recommends the *turnep*, because, says he, such roots as are not wanted for the table, will serve cattle. The famous Jethro Tull, who wrote in 1733 on Husbandry, in "Chap. X. of Turneps," commences, "as far as I have been informed, it is but of *late years* that Turneps have been *introduced* as an improvement in the *field*. By sowing them at convenient distances, not one," says this great improver of Husbandry, "weighed so little as six pounds, and most of them thirteen, or even fourteen pounds." Tull complains, that his example did not induce his neighbours to follow his practice. Thus we are able to trace the introduction nearly of all the great improvements in Husbandry and Gardening, and with pleasure notice step by step the progress of society.*

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* The Duke of Northumberland has an household book of an Earl of that family who lived in the reign of Henry VII, which shews how little *vegetables* were used, or even *fresh meat* in those days. The book states, "Two hundred and fifty quarters of malt are allowed, at four shillings a quarter: two hogsheads are to be made of a quarter; which amounts to about a bottle and a third of beer a day to each person, p. 4. and the beer will not be very strong. One hundred and nine fat beeves are to be bought at Allhallow-tide, at thirteen shillings and four-pence apiece: and twenty-four lean beeves to be bought at St. Helens at eight shillings apiece: these are to be put into the pastures to feed; and are to serve from Midsummer to Michaelmas; which is consequently the only time that the family eats fresh beef: during all the rest of the year they live on salted meat, p. 5. One hundred and sixty gallons of mustard are allowed in a year; which seems indeed requisite for the salt beef, p. 18. Six hundred and forty-seven sheep are allowed, at twenty pence apiece; and these seem also to be all eat salted, except between Lammas and Michaelmas, p. 5. Only twenty-hogs are allowed at two shillings apiece; twenty-eight veals at twenty-pence; forty lambs at ten-pence or a shilling, p. 7. These seem to be reserved for my lord's table, or that of the upper servants, called the knights' table. The other servants, as they eat salted meat almost through the whole year, and with few or no vegetables, had a very bad and unhealthy diet: so that there cannot be any thing more erroneous than the magnificent ideas formed of *the Roast Beef of Old England*. We must entertain as mean an idea of its cleanliness: only seventy ells of linen at eight-pence an ell are annually allowed for this great family: no sheets were used: this linen was made into eight table cloths for my lord's table; and one table cloth for the knights, p. 16. This last, I suppose, was washed only once a month. Only forty shillings are allowed for washing throughout the whole year; and most of it seems expended on the linen belonging to the chapel. The drinking, however, was tolerable, namely, ten tuns and two hogsheads of Gascogny wine, at the rate of four pounds thirteen shillings and four-pence a tun, p. 6. Only ninety-one dozen of candles for the whole year, p. 14. The family rose at six in the morning, dined at ten, and supped at four in the afternoon: the gates were all shut at nine, and no farther ingress or egress permitted, p. 314. 318. My lord and lady have set on their table, for breakfast at seven o'clock in the morning, a quart of beer; as much wine; two pieces of salt fish, six red herrings, four white ones, or a dish of sprats. In flesh days half a chine of mutton, or a chine of beef boiled, p. 73. 75. Mass is ordered to be said at six o'clock, in order, says the household-book, that all my lord's servants may rise early, p. 170. Only twenty-four fires are allowed, beside the kitchen and hall, and most of these have only a peck of coals a day allowed them, p. 99. After Lady-day, no fires permitted in the rooms, except half fires in my lord's and lady's, and lord Piercy's and the nursery, p. 101. It is to be observed that my lord kept house in Yorkshire, where there is certainly much cold weather after Lady-day. Eighty chalders of coals at four shillings and two-pence a chalder, suffices throughout the whole year; and because coal will not burn without wood, says the household book, sixty-four loads of great wood are also allowed, at twelve-

Beet-Root (BETA VULGARIS). The Red Beet is very well known, and a large variety of the White Garden Beet has been lately introduced from abroad, under the titles of *Racine de disette, Root of Scarcity*, and *Mangel Wurzel*. This last is much cultivated in many parts of the continent, not only in gardens, but likewise in the open fields; being much more in esteem, and perhaps really better than with us. Its qualities, and the quantity of its produce, have been greatly magnified, in common with most other things newly introduced. The leaf and root are said to be excellent food for man and beast: it is affirmed not to be liable to destruction by insects; nor to be affected by drought, &c. The leaves are recommended as equal in quality to Spinach: and being from thirty to forty inches long, and from twenty-two to twenty-five broad, exceed it greatly in quantity. These may be gathered every twelve or fifteen days during the season.

The roots have an earthy taste; and are mawkishly sweet, either boiled,

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pence a load, p. 22. This is a proof that grates were not then used. Observe this article. *It is devised that from henceforth no capons to be bought but only for my lord's own mess, and that the said capons shall be bought for two-pence apiece, lean, and fed in the poultry; and master chamberlain and the stewards be fed with capons, if there be strangers sitting with them*, p. 102. Pigs are to be bought at three-pence or a groat apiece: geese at the same price: chickens at a half-penny: hens at two-pence, and only for the abovementioned tables. Here is another article. *Item, It is thought good that no plovers be bought at no season but only in Christmas and principal feasts, and my lord to be served therewith, at his board end, and none other, and to be bought for a penny apiece, or a penny halfpenny at most*, p. 103. Woodcocks are to be bought at the same price. Partridges at two-pence, p. 104, 105. Pheasants a shilling; peacocks the same, p. 106. My lord keeps only twenty-seven horses in his stable at his own charge: his upper servants have allowance for maintaining their own horses, p. 126. These horses are, six gentle horses as they are called, at hay and hard meat throughout the whole year, four palfreys, three hobbies and nags, three sumpter horses, six horses for those servants to whom my lord furnishes a horse, two sumpter horses more, and three mill horses, two for carrying the corn, and one for grinding it; whence we may infer, that mills, either water or wind-mills, were then unknown, at least very rare: besides these, there are seven great trotting horses for the chariot or waggon. He allows a peck of oats a day, besides loaves made of beans, for his principal horses; the oats at twenty pence, the beans at two shillings a quarter. The load of hay is at two shillings and eight-pence. When my lord is on a journey, he carries thirty-six horsemen along with him; together with bed and other accommodation, p. 157. The inns, it seems, could afford nothing tolerable. My lord passes the year in three country seats, all in Yorkshire, Wrysel, Leckenfield, and Topelyffe; but he has furniture only for one: he carries every thing along with him, beds, tables, chairs, kitchen utensils, all which, we may conclude, were so coarse, that they could not be spoilt by the carriage: yet seventeen carts and one waggon suffices for the whole, p. 391. One cart suffices for all his kitchen utensils, cooks' beds, &c. p. 388. One remarkable circumstance is, that he has eleven priests in his house, besides seventeen persons, chanters, musicians, &c, belonging to his chapel: yet he has only two cooks for a family of two hundred and twenty-three persons, p. 325. Their meals were certainly dressed in the slovenly manner of a ship's company. It is amusing to observe the pompous and even royal style assumed by this Tartar chief: he does not give any orders, though only for the right making of mustard, but it is introduced with this preamble, *It seemed good to us and our council.*

fried, or in salad. They weigh ten or twelve pounds when transplanted; but when left in the ground where they were sown have weighed as high as twenty-four pounds.

The ancients called the white Beet *Cicla*, or rather *Sicla*, by contraction from *Sicula*, Sicilian Beet; as we call the Savoy Cabbages, *Savoys*.

Mr. Miller mentions three varieties of this: the White, the Green, and the Swiss or Chard Beet: by the last of these he probably intended the same as the modern Mangel Wurzel, or Racine de Disette. He affirms, that they vary from one to another in culture, as he has often experienced, but that they never alter to the common kind.

An anonymous writer in the Gentleman's Magazine (Vol. LVIII. 2. p. 872.) informs us, that three varieties appeared from seeds procured from Dr. Lettsom. 1. With leaves and stem dark green; which was the most common. 2. With stem and leaves of a brighter colour; which he takes to be the white Beet. 3. With stem and veins of the leaves red; which he says is the red Beet. All of them have flowers in clusters from two to three; pistils from two to five; a leaf growing from the base of the flowers; the segments of the calyx equal, hunched, and membraneous at the edge.* Few plants flowering the first year, he concludes it to be biennial; as indeed all the garden sorts are, if not the wild Sea Beet also, although Linnæus sets it down as annual, and Ray as perennial.

Dr. Lettsom, who took much pains to introduce the Mangel Wurzel, informs us, that on his own land, which was not favourable to its growth, the roots, upon an average, weighed full ten pounds, and if the leaves were calculated at half that weight, the whole product would be fifteen pounds of nutritious aliment upon every square of eighteen inches.†

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* See also pp. 1043, 1044 of the same volume.

† The following accounts of the culture of the Beet Plant, the application of its leaves as food for cattle, of its root for making sugar, of its syrup as yielding molasses and ardent spirit, and of its residuum for other useful purposes, have been lately sent from Germany, along with a sample of the sugar, by Mr. John Taylor, of Leipsig, to the Secretary, and by him communicated to the Society.

Dear Sir,

In compliance with your desire, I have taken some pains to examine into the merits of the various processes for preparing sugar from the Beet-root, and to gain information upon the culture of the plant. You well know that Director Achard, of Berlin, first introduced this subject into general notice, and recommended that the sugar should be procured by boiling the Beet-roots, when taken out of the earth; that they be sliced when cold: that afterwards the saccharine

juice be pressed out; that it be filtered, evaporated, and, after evaporation, the sugar be procured by crystallization and pressure. That account having been printed in England, I shall not notice it further, but proceed to such other observations as have arisen from subsequent experiments.

The kinds of Beets which have been used for the preparation of sugar from their roots, are varieties of that species called the Beta vulgaris, or Beta caule erecto of Linnæus, and of his Pentandria Digynia class and order: they consist of the Beta rubra vulgaris, Beta rubra major, Beta pallide virens major, Beta alba vel pallescens quæ Cicla officinarum, and Beta communis viridis. Of these the principal are the Beta rubra vulgaris, runkel Rube of the Germans, or red Beet of the English, and the Beta Cicla, den weissen Mangold, of the Germans, or the white English Beet; and varieties of these whose roots have coloured rings.

Method of culture of the *Beta vulgaris* of Linnæus; *Runkel Rube*, of the Germans; *La Bette*, of the French; or *Common Beet*, of the English.

The soil should be a good black earth, not too moist; the land should be prepared as for cabbages, namely, dunged in autumn with short rotten dung, and ploughed; turned again in spring, and then ploughed a third time much deeper than before. The land on which (Kohl) white cabbage has been planted the preceding year, answers well for the culture of the Beet, such land having been generally kept clean from weeds, and well dunged. The seeds are usually placed from twelve to eighteen inches distant from each other, and one inch deep in the earth. The finger is used for the purpose, or an instrument resembling a bean-setter, with this difference, that the teeth are an inch long, and the above-mentioned distance from each other. In each hole one seed is laid, and immediately covered with earth. As the field where the Beet-root is sown is easily overrun with weeds, and the Beet-plants do not spring so soon as many of the weeds; therefore the ground must be weeded in four or five weeks time, and some weeks afterwards hoed: and since from one seed three or four plants frequently grow, or by negligence several seeds are sometimes thrown into one hole, therefore the extra plants must be drawn out to be placed where there are vacancies, and the weeds must be frequently destroyed. There is this advantage in sowing the seed in the method above mentioned, that the plants remain, and are not checked in their growth by change of situation. It is necessary, however, to pick out good and ripe seed, to prevent vacant places in the field.

Some prefer transplanting the roots to sowing the seed on the ground where the plants are intended to remain; and, in such case, make use of a stick to form the hole; the length of the stick determining the distance at which the plants should be placed from each other. After the plants have been some weeks in the ground, the earth should be loosened with a hoe, and the weeds destroyed.

The Red Beet is the kind which has been usually grown in the neighbourhood of Halberstadt; and the leaves of this, and the others, are eaten, when prepared, as spinach for the table; but are principally emplöyed as herbage for cattle, who are fed therewith in the stalls.

The roots are pleasant food when boiled, sliced, and eaten cold, either alone or in salads.

As the method which Professor Gottling has invented, to separate the sugar from Beet-roots, appears to me the most easy to be put in general practice, at little expence, and best calculated for Great Britain, I shall notice it more particularly.

He recommends the Beet-roots to be taken out of the ground about the middle of September, or from that time to the middle of October, in order to have good weather to dry them: they should be washed from their adhering earth, as speedily as possible, and their small fibres should at the same time be cut off; as likewise such part of the root as in growing had risen above the surface of the earth.

The roots are to be afterwards wiped with a cloth, and laid upon a dry floor; their heads are to be cut off and given to the cattle: the roots should be then sliced lengthways down the middle, each half again cut into thin slices, and loosely hung on strong thread upon nails, in an airy chamber or place secure from the rain. The slices should not be placed too near together, lest they spoil, nor too many be put upon one string, lest it should break; it is advisable to turn the strings upside down, once or twice, to effectuate a speedy drying. In the course of ten or twelve days they become so dry that the strings may be removed nearer together, in order to allow fresh Beet-roots to be hung up, if there should be scarcity of room.

In the course of fourteen days, or three weeks, they will be sufficiently dry for their sugar to be

extracted. In case there may not be sufficient room to dry them in the house, they may be dried in a barn, or any place secure from the rain. Instead of placing the sliced roots upon strings, stages may be made in out-buildings, or any place secure from the rain. The sliced Beet-roots may be laid on netted frames within them, as in glue manufactories; but as children may be employed to string them, you may dry on strings a greater quantity of Beet-roots in a small compass.

If the drying season is far advanced, or a frost expected, the Beet-roots should not then be exposed to the outward air, but dried in the kitchen or warm rooms on strings, or netted frames, resembling the flakes used in Yorkshire for drying oat-cakes; as the roots become dry, they may be placed closer together. The slicing of the Beet-roots, properly forms the evening's occupation: no more should be sliced at once than can be strung or placed on frames to dry, as it is not advisable to let the roots remain in slices long in a heap. The roots may be dried in stove-rooms by artificial heat; but great care is then required to keep them free from smoak, or being burnt, otherwise the sugar will be dark-coloured, and of an unpleasant taste. It is better, therefore, not to dry the roots in stoves, unless in cases of necessity, such as where the frosts may prevent the roots from being dried in the open air.

The roots should be dried throughout, and not partially. If they appear grey on the outside, they should yet be inwardly white or red; and if chewed between the teeth, have an extremely sweet taste, free from must or acidity.

In large concerns, it would be best to slice the roots with machines contrived for the purpose: such as are used in England for slicing turnips, would do the business.

Where opportunity will not permit the Beet-roots to be sliced soon after being taken out of the earth, they should be placed in cellars, and covered with straw, or put into holes in dry sandy earth, and preserved till wanted, as potatoes are done in England.

In what degree the freezing, or longer preservation of the Beet-roots may affect their saccharine qualities, is not yet sufficiently ascertained. Some trials made at Waltersdorf did not seem to occasion any material alteration.

When the Beet-roots are dry, they are ready for their sugar to be extracted: you must then provide three wood-tubs, wide, but not deep: oak, ash, or willow, will answer; but fir, or resinous wood, is not proper for their purpose: earthen mugs may serve for family use. If you employ wood vessels, there should be cocks or spigots near the bottom of the tubs, and the tubs placed in a cool situation between eight and ten degrees of Reaumur's thermometer, or fifty-two degrees of Fahrenheit's, upon a stillage, near to each other; and so high from the ground, that smaller vessels may stand below them, to receive the liquor when drawn off.

There should be good clear water near at hand, so as to be pumped into the higher vessels.

The Beet-roots having been dried, as above directed, must be sifted, to free them from the dust and loose fibres; then having half filled one of the higher tubs with clean roots, pour clear cold water thereon, to about one third in height above the roots: let them thus remain for three hours, stirring them at different times with a wooden paddle.

After the expiration of three hours, put into the second tub as many clean dried roots as had been placed in the first; draw the sweet liquor from the first tub into the vessel underneath, and pour it upon the roots in the second: then put into the first tub more fresh water, sufficient barely to cover the roots, and suffer the tubs to remain three hours more, stirring the roots repeatedly, as before.

The liquor which had been poured from the first to the second tub, will be now much absorbed by the roots in the second tub. After standing again for three hours, the sweet liquor from the second tub must be drawn off, which, if the roots were of the red and white ringly sort, will be of an agreeable red colour: it must now be run through a sieve, or filtered through a flannel, and should be fit for boiling down for sugar.

After this, draw the liquor from the first tub, pour it on the second, and pour on the first tub more fresh water, and let it stand three hours longer.

Then put into the third tub the usual quantity of dry roots, and pour thereon the liquor from the second tub: remove the liquor from the first tub to the second; and the roots in the first tub being now deprived of their saccharine matter, may be used for feeding hogs or cattle.

After three hours more, the liquor should be drawn from the third tub, by filtering, as before, and may be boiled down for sugar.

Then draw off the second vessel, and pour the liquor into the third; add fresh water to the second vessel, and let it remain three hours more, stirring the roots from time to time.

During this time, cleanse out the first tub, and add fresh roots, as before. In three hours time, draw the liquor from the third tub, and pour it upon the fresh roots in the first; then draw the liquor from the second tub, and pour it on the third: the roots of the second tub will be now exhausted and may be given to the cattle.

After three hours, draw off the liquor from the first tub, filter it, and it will be ready to boil down. On the contents of the first, pour the liquor of the third, and put fresh water in the third tub; let it remain therein three hours, stirring it as usual: during which time clean out the second tub, and give the roots to the cattle.

In the second tub fresh roots are again to be placed: proceed by extracting the saccharine matter, as before, and continue the operation, till all the ready dried roots have been thus freed from their sugar.

By this management the liquor becomes more charged with saccharine matter than you find the juice is when pressed out of the roots, and a considerable quantity of fuel is spared. The roots from which the liquor has been extracted will have swelled much in the operation, and have lost their sweetness: their farinaceous residuum will, however, afford good food for cattle.

It is not advisable to have the vessels made too large for extracting the sugar, lest there should be too much liquor to boil down at the last. For the same reason, I think it better not to pour water the third time upon the last parcel of dried roots, but rather use them immediately for food for cattle, as they will not pay well for boiling down.

Whenever there is a sufficient quantity of dried roots ready, the process of extracting the saccharine liquor should be continued day and night, as it is not proper to let the liquor remain longer than three, or at most four hours, before you boil it, lest a dissolution of the mucilaginous particles of the roots should take place.

If it is not convenient to boil down all the saccharine liquor at once to a state of crystallization, yet it should be daily boiled down to the consistence of a syrup, to prevent its fermentation.

In boiling the liquor, take off the scum which arises.

On the Boiling, Crystallization, &c. of the Beet Sugars.

First boil the extracted saccharine liquors down to the consistence of syrup; then put it into a copper, of which one third at least is empty, and let it boil away, by a moderate fire, until a vial which holds one ounce of water will contain eleven drachms of the syrup, or until the syrup pours somewhat broad from the ladle.

As the froth or scum arises, it must be carefully taken off. When the syrup is arrived at the point above mentioned, by gentle boiling, the fire must be removed from underneath the copper, and the syrup gradually run through a clean woollen cloth placed over a wooden or stone vessel.

The syrup must not cool too much before thus filtered, otherwise it become ropy; when the filtered syrup is somewhat cool, it should be laded into shallow wooden or stone vessels, to crystallize: shallow earthen vessels, such as are used to produce cream, are proper for the purpose. Vessels made of tin will answer.

These vessels, filled with syrup, must be placed in a room heated from fifteen to eighteen degrees of Reaumur's thermometer, or sixty-eight of Fahrenheit's; and care must be taken to keep them clear from flies and dust.

If the syrup has been of a proper consistence, crystals will soon begin to form at the bottom of the vessels: and in the space of eighteen or twenty-one days the crystallization will be completed. The mass must then be put into a strong linen sack, well secured, and placed under a press to squeeze out the liquid from the sugar which remains in the bag; the liquid matter may be set to crystallize a second or third time, and will yield sugar of a coarser quality. A cheese press or long lever will serve for the purpose of pressure.

The sugar first obtained may be rendered purer by well mixing therewith a small quantity of

clear spring water, and placing it again under the press; the coloured syrup will then run out, and leave the sugar in the bag in a much purer state than before: by repeating the operation, it is so far improved, that, when dried and rubbed, it becomes a fine white powder sugar.

The separated syrups should be again carefully boiled, and more sugar will be obtained from them by crystallization.

If the sugar procured by the first pressure be dissolved in as much clear water as will form a syrup, and placed again in a warm room to crystallize, it will yield a much purer and harder sugar; the syrup may then be separated without pressure from the sugar, merely by inclining the vessel, and allowing the syrup to run off from the crystals.

All the syrups prepared as above directed, are fit for family use, and are much superior in taste to those prepared from the pressure of the raw or boiled roots.

The remaining thick syrups may be used as treacle or molasses, and will serve to distil for rum or spirits.

The process above mentioned is so simple and easy, as to be within the reach of every farmer to accomplish; on which account I have entered more minutely into a detail of it. I shall now annex some other observations, principally drawn from the experiments of Professor Lampadius, of Freyberg, near Dresden, by which it appears that Beet-roots contain water, fibrous matter, sugar, mucilage, glair, starch, colouring matter, scented matter, and a bitter substance. The water is in the proportion of from one half to two thirds of the weight of the roots; the fibrous matter of the roots differs, and is considerably more in poor than rich land; the saccharine particles vary from two to five per cent.; the mucilage is from three to five per cent.; and the glair, or matter resembling white of egg, is about one per cent.; the starch is in very small quantity, being only about two or three ounces in a hundred weight: the colouring matter undergoes several changes by exposure to the air, as yellowish, brown, and red, and may be precipitated by acetite of lead: the scented matter is volatile; it rises in distillation of the root with water, combines closely with spirits of wine, and this matter occasions a peculiar contraction in the organs of taste. By boiling the Beet-roots the smell and taste are very much lessened. The bitter substance is soluble in water, and remains behind in the first syrup after the crystallization of the sugar.

The following are some experiments of Professor Lampadius.—One hundred and ten pounds of Beet-roots, the Beta cicla of Linnæus, or white English Beet, washed, peeled, cleaned, and then grated, gave a mass which weighed eighty-seven pounds; out of which were pressed forty-one pounds and a half of juice, which was boiled with twenty ounces and a half of charcoal powder: this, when filtered and evaporated down until crystallized, produced full five pounds of a brownish yellow-grained sugar, also five ounces of brown syrup.

The above brown sugar, after being dissolved in six pounds of lime water, mixed with one pound of blood, then boiled, filtered, and afterwards evaporated, yielded four pounds five ounces and a half of purified brown sugar, and six ounces and a half of syrup.

The four pounds five ounces and a half of sugar thus prepared, were again dissolved in six pounds of lime water, mixed with one pound of milk, then boiled for a quarter of an hour: during the boiling, a small quantity of white wine vinegar, and a little more milk, were added; the saccharine matter was filtered, and treated as before; the product was four pounds of well-grained white powder sugar.

The residuum after pressure, the brown syrups of the two first processes, and the remains of the filtrations, weighed, when collected, forty pounds: they were mixed with one quart of yest and eighty quarts of water, heated to 40 degrees of Reaumur's thermometer, or 112 of Fahrenheit's, and, after fermenting forty-eight hours, were distilled. They furnished, at the first distillation, fifteen quarts of weak spirit, which, on a second distillation, gave eight quarts of a better; from which, when rectified, were produced three quarts and a half of spirits resembling rum.

From the result of this series of experiments it appeared, that after paying the farmer for the roots, and discharging all incidental expences whatever, a profit was yielded of nearly cent. per cent. on valuing the four pounds of white powder sugar at one shilling per pound, and the three quarts and a half of rum at one shilling per quart.

It is not to be inferred from these experiments, that the profit from this process will always equal the above: for subsequent experiments have proved that the crops of Beet-roots cannot

In Gleanings in Agriculture, p. 296, we find the following article.

Pistachia (PISTACHIA TEREBINTHUS.) *Culture, &c.* 1. Increased by nuts planted in pots, and plunged into a moderate hot-bed.

By suckers.

2. Tree. When first raised from the nuts to be gradually inured to the open air, to which they should be wholly exposed the beginning of June, and at the approach of winter screened from the frost under a hot-bed frame, constantly exposing them to the air in mild weather.

When the trees have been gradually inured to our climate for three or four years, they are to be planted against walls, or in a sheltered situation.

Is a native of Arabia, Persia, and Syria.

3. Use. The fruit; which ripens in England in favourable seasons.

In the *Levant*, where the *Pistacia* is native, this tree grows to the height of twenty-five or thirty feet; the bark of the stem and old branches is of a dark russet colour, but that of the young branches is of a light brown. The leaves in the *vera* of Linneus (n. 3.) are composed of two or three pairs of leaflets, terminated by an odd one; they approach towards an ovate shape, and their edges turn back; in the *trifolia* of Linneus, the leaves, for the most part, have three, but sometimes four ovate leaflets, of a dark green colour: and the *narbonensis* has three or five roundish leaflets, of a light

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always be depended upon, nor do they always yield the same quantity of sugar; the produce of different years having varied, from two pounds of sugar per hundred weight of roots, to five pounds, according to circumstances which have intervened.

However, I hope you will find the culture of the Beet-plant an object of consequence, on considering that its leaves afford nourishment for men and cattle; that its roots may be used as food, or to furnish sugar, one of the greatest luxuries of life; that, after the sugar is extracted, the roots are even then serviceable for cattle; and that the refuse-syrups will produce a wholesome spirit. In dry summers its herbage will be of great service to cattle, and does not give a bad taste to the milk; and in hard winters the roots are wholesome food. The Beta cicla is the Mangel Wurzel, or Root of Scarcity, of Dr. Lettsom, who has said much upon its use as food. Its advantages are now called forth to notice in other points of view, and deserve attention. In particular circumstances it may become a very useful article; time will determine its real merits.

The remarks I have here given you are very short, in comparison with the observations I have collected, which extend through every department of the business. If you want any further information, I will furnish it; but the above accounts appear to me sufficient to engage your present attention.

I remain, dear Sir, your affectionate Son,

JOHN TAYLOR.

Leipsic, May 20, 1800.

To Mr. CHARLES TAYLOR.

green colour. The leaves in all these, which seem not to be distinct species, emit an odour like that of the nut, when they are bruised. Some of the trees produce male flowers, others female; and some, when they are old, have both on the same tree. The male flowers come out from the side of the branches in loose bunches, and are of an herbaceous colour. The female flowers come out in the same manner in clusters.

Mr. Swinburn observes, that the male tree of the Pistacia (*P. trifolia Lin.*) has small oblong blunt leaves, of a dusky green; the flowers thick and in bunches; the female blossoms are more scattered, the leaves larger, harder, rounder, and of a lighter colour. The male puts forth its flowers first, and some gardeners pluck them whilst yet shut, dry them, and afterwards sprinkle the pollen over the female tree: but the method usually followed in Sicily, when the trees are far asunder, is to wait till the female buds are open, and then to gather bunches of male blossoms ready to blow; these are stuck into a pot of moist mould, and hung upon the female tree, till they are quite dry and empty. This operation is called *tuchiarare*, and never fails to produce fructification; sometimes the gardeners ingraft the male bud upon the female tree. The male tree is called in the Sicilian language *Scornabecco*, and the fruit *Fastugo*.* Our old writers call it *Fisticke nut*.

Though one variety of the Pistacia tree has the appellative of *narbonensis*, and P. trifolia is said to be a native of Sicily, yet there is no doubt of its having originally been brought into Europe, with most of our valuable fruits, from the eastern countries. Pliny relates, that the Emperor Vitellius introduced it into Italy from Syria, when he was Legate in that province.

Another plant of the same genus, the *Gum Mastick Tree* (PISTACHIA LENTISCUS) might be brought also to bear our winters. It is native of the South of Europe, and the Levant. Desfontaines informs us, that it is very common in Barbary both wild on the hills and cultivated in gardens; but that it is little if at all resinous, though the branches and bark of the trunk were wounded at different seasons of the year; that the wood however yields an aromatic smell in burning; and that the berries yield an oil fit both for the lamp and the table.

In the island of Chio the officinal Mastick is obtained most abundantly,

* Travels in the Two Sicilies, Vol. II. p. 255.

by making transverse incisions in the bark of the tree, whence the Mastick exudes in drops, which are suffered to run down to the ground, and after they are concreted they are collected for use. These incisions are made at the beginning of August, when the weather is very dry, and are continued till the end of September.

Mastick is a resinous substance, brought to us in small yellowish transparent brittle grains or tears: it has a light agreeable smell, especially when rubbed or heated: on being chewed, it first crumbles, soon after sticks together, and becomes soft and white, like wax, without impressing any considerable taste. It totally dissolves, except the impurities, which are commonly in no great quantity, in rectified spirit of wine, and then discovers a degree of warmth and bitterness, and a stronger smell than that of the resin in substance. Boiled in water, it impregnates the liquor with its smell, but gives out little or nothing of its substance; distilled with water, it yields a small quantity of a limpid essential oil, in smell very fragrant, in taste moderately pungent. Rectified spirit brings over also in distillation the more volatile odorous matter of the Mastick.

It is a common practice with the Turkish women to chew this resin, especially in the morning, not only to render their breath more agreeable, but to whiten the teeth, and strengthen the gums; they also mix it with their fragrant waters, and burn it with other odoriferous substances in the way of fumigation. It is used in Europe by japanners, in some of their varnishes.

It was cultivated here in 1664; as appears in Evelyn's kalendar; and flowers in May.* The only tree which Dr. Woodville observed to flower in England, was a male plant in the Apothecaries Garden at Chelsea.

This tree was nursed for some years, but at last it became naturalized to our climate, and stands without shelter at the entrance of that beautiful garden. Miller in his Dictionary says, that the *Turpentine Tree*, if treated in the same way, may be rendered as hardy. There is now, he adds, a tree of this sort growing in the garden of the Bishop of London at Fulham, against a wall, which was planted there in Bishop Compton's time, and endured the winters without cover, and some plants, which even had not this shelter, but were planted in the open air in the garden of the Duke of

* Hort. Kew.

Richmond at Goodwood in Sussex, survived several winters without the slightest protection.

The gleaner has the following observation on the *Pomegranate* (PUNICA GRANATUM).

Culture, &c. 1. A rich strong soil, and a warm situation.

2. Increased by layers in the spring, which will take sufficient root in a year's time.

3. Tree. Grows eighteen or twenty feet high.

Best season for transplanting is in the spring, but may be performed in autumn.

It is so hardy as to resist the severest cold of our climate.

Bears fruit at the extremity of the branches.

Pruning when trained as well as wall trees.

Summer...Cutting off fore-right shoots.

Michaelmas...Cutting out weak branches of the former year, and shorten the stronger.

The branches to be laid four or five inches asunder.

4. Use. The fruit; which the tree often produces, in great quantities, in England, and of a full size; but not quite so well flavoured as the foreign.

It is a native of Spain, Portugal, Italy, Barbary, Persia, Japan, China, Cochinchina, &c. But in the West Indies, where it is supposed to have been introduced from Europe, the fruit is thought to be larger and better flavoured.

Miller, discoursing on the *Pomegranate*, says, the single Pomegranate is now pretty common in the English gardens, where formerly it was nursed up in cases, and preserved in green-houses with great care (as was also the double flowering kind); but they are both hardy enough to resist the severest cold of our climate in the open air; and, if planted against warm walls in a good situation, the first will often produce fruit, which in warm seasons will ripen tolerably well; but as these fruits do not ripen till late in the autumn, they are seldom well tasted in England, for which reason the sort with double flowers is commonly preferred to it. The sort with sweet fruit, as also the wild sort, are less common in the English gardens than the former two.

"The wild, I think," says Parkinson, "was never seen in England,

before John Tradescante, my very loving good friend, brought it from the parts beyond the seas, and planted it in his Lord's garden at Canterbury."

This fruit might be produced in great perfection in Devonshire.

The *Myrtle* (Myrtus). In Gleanings from Books in Agriculture and Gardening we have the following account.

1. Common Myrtle. (Myrtus *Communis.*)

2. Dutch Myrtle. (Myrica *Gale.*)

3. Candleberry Myrtle. (Myrica *Cerifera.*)

Culture, &c. of Dutch Myrtle or Gale.

1. Soil. Grows spontaneously in this country on marshy barren ground.

2. Shrub. Grows erect, and is about two or three feet high: the leaves have a sweet, agreeable myrtle-like odour.

3. Use. Is used instead of hops; but unless it is boiled a long time, it is apt to occasion head-ach.

The cones boiled in water will yield a scum like bees wax, capable of being made into candles.

This plant would be useful in cotton spinning manufactures, which, in hot weather, are exposed to the biting assault of a species of vermin (*Pulex*), which breeds in the dust, and other refuse, necessarily produced in the operation of spinning: the smell of it being so obnoxious to these vermin and moths, that they precipitately fly its approach. Hog-sties littered with it, frees swine from lice.

Gathered in the autumn it dies wool yellow.

It is used to tan calf-skins.

Linnæus, from the smell of the plant, is induced to suspect, that *Camphor* might possibly be prepared from it.

Culture, &c. of Candleberry Myrtle.

1. Increased by seed sown in the spring; the young plants must be screened from the frost the first winter.

2. Tree. Bears very well our climate.

3. Use. In America the berries are boiled in water; when the water is cold, they skim off the wax that proceeds from the berries, and make candles of it.

Culture, &c. of Common Myrtle.

1. Shrub. In Cornwall and Devonshire grows every where in the open

air, without the aid of green-houses, particularly on the southern coast: in other parts of this island requires the protection of a green-house.

2. Use. Armstrong, in his history of the island of Minorca, considering myrtles as natives of Cornwall, recommends the cultivation of them, with a view to prevent oaks being cut down at an improper season, for the sake of more easily stripping off the bark; the tops of myrtle being used for tanning in Minorca.

The young tops are used in dyeing.

The berries are eaten by the natives of Minorca.

The *Common Myrtle* is well known as an elegant evergreen shrub, native of Asia, Africa, and the southern parts of Europe; unfortunately just too tender to abide our winters without some protection in England, except in the most southern and western parts of the island. Trunk irregular, branching, covered with a brown rough scaling bark. Leaves ovate or ovate-lanceolate, entire, smooth on both sides, dark-green paler underneath, opposite and decussated. The flowers come out singly from the axils, and have a two-leaved involucre under them. Corolla white. Berry inferior or below the calyx, subovate, crowned with the permanent calyx, fleshy and spongy, dark purple or black-blue, three-celled. Seeds in each cell four or five, seldom more, kidney-form, gibbous, whitish, shining, somewhat bony at the back, the belly filled with a fungous substance, fixed to the inner angle of the cells: they have a single, cartilaginous or somewhat bony, thick cover, no albumen, the embryo conformable to the cavity of the seed, roundish, curved, milk-white: cotyledons semicylindric, short, incumbent: radicle twice the length of the cotyledons, semicircular, curved, inferior.* They flower in July and August. The cultivation of the Myrtle in England, is assigned in the Kew catalogue to the year 1629, when Parkinson informs us that he had three sorts (varieties) in his garden; the broad-leaved and two varieties of the box-leaved: Gerarde however, in 1597, says that Myrtles never bear any fruit in England, which surely implies the cultivation of it among us before that period. And Bradley informs us, that the Myrtle was introduced by Sir Francis Carew and Sir Walter Raleigh in 1585, when they resided in Spain, and discovered the preparations for the Spanish Armada against us.† Mr. Evelyn also, in the year 1678, says, "I know of one (a

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* Gærtner.

† Husb. and Gard. Vol. III. part ii. p. 61.

Myrtil) near eighty years old, which has been continually exposed, unless it be, that in some exceeding sharp seasons a little dry straw has been thrown upon it."* Perhaps he may allude to the tree at Bedington. But that was the Spanish broad-leaved or Orange-leaved variety, which Miller and Bradley report to have been above eighteen feet high, and to have spread about forty-five feet.†

Let us proceed now to dyes.

Madder (Rubia Tinctorum) has a perennial root, and an annual stalk. The root is composed of many long, thick, succulent fibres, almost as large as a man's little finger; these are joined at the top in a head, like the roots of Asparagus, and strike very deep into the ground, being sometimes more than three feet in length. From the upper part (or head of the root) come out many side roots, which extend just under the surface of the ground to a great distance, whereby it propagates very fast; for these send up a great number of shoots, which, if carefully taken off in the spring, soon after they are above ground, become so many plants. These roots are of a dark colour on their outside, somewhat transparent, and have a yellowish red pith in the middle, which is tough and of a bitterish taste: from the root arise many large, four-cornered, jointed stalks, which in good land will grow five or six feet long, and, if supported, sometimes seven or eight; they are armed with short herbaceous prickles, and at each joint are placed five or six spear-shaped leaves, about three inches long, and near one broad in the middle, drawing to a point at each end; their upper surfaces are smooth, but their midribs on the under side are armed with rough herbaceous spines; the leaves sit close to the branches in whorls. From the joints of the stalk come out the branches, which sustain the flowers; they are placed by pairs opposite, each pair crossing the other; these have a few small leaves toward the bottom, which are by threes, and upward by pairs opposite, the branches are terminated by loose branching spikes of yellow flowers, which are cut into four segments resembling stars. These appear in June, and are sometimes succeeded by seeds, which seldom ripen in England.

Native of the South of Europe, the Levant, and Africa. Cultivated by Gerarde, in 1597.‡

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* Sylvia, B. II. c. v. p. 174. fol. 1706.

† Mill. Dict. edit. 1724. Bradl. p. 64. ‡ Hort. Kew.

It is well known that Madder is so essential to dyers and calico-printers, that neither business can be carried on without it. The consumption of it is so great in England, that upon a moderate computation, more than one hundred and eighty thousand pounds sterling is annually paid for what is imported from Holland. This might be saved to the public, if a sufficient quantity of Madder were planted in England, where it might be cultivated to greater advantage than in Holland, our lands being better adapted to the growth of this plant.

The cultivation of Madder has been several times attempted, when our commerce with Holland has been interrupted, or the Dutch have raised the price of the commodity enormously. At the end of the 17th century, Madder was worth about six pounds the hundred weight. The quantity imported from Holland being six hundred and fourteen tons and an half; supposing that all together, some being better, some worse, it was worth five pounds the hundred on an average; the sum paid the Dutch for Madder was 61,450l. It was planted near Wisbech, and they cured a great deal there; upon which the Dutch sold theirs so low as forty shillings the hundred, by which means our planters were so discouraged as to lay their plantations by.*

The dearness of Dutch Madder, induced Mr. Miller, in the year 1758, to publish a quarto pamphlet on the cultivation of this useful plant, with figures of it, and of the stoves, kilns, drying-houses and mills, used by the Dutch in preparing the root; but I believe the culture was not carried to any great extent, and was soon dropped.

Since that time, the Society for the Encouragement of Arts, Manufactures and Commerce have taken up the Culture of Madder; and inform the public, in the first volume of their Transactions, published in 1783, that Madder having been raised to an extravagant price by the foreign growers and importers, on a supposition that it could not be brought to any degree of perfection in this kingdom, considerable premiums were given, to the amount of fifteen hundred pounds and upwards, besides two gold medals, to encourage its growth here; and that the commodity produced in consequence, was found as good at least, if not better, than any imported. By these premiums, fixing the tithes at five shillings an acre, and continuing the rewards, foreign Madder was reduced to a reasonable price, and may probably con-

* Houghton's Collections, Vol. II. p. 372.

tinue so, unless other causes should operate to make it dearer; as the foreign growers are convinced that we can supply ourselves with any quantity, and of the best kind, whenever, by an advance of the price, the profits are found sufficient to engage the attention of our husbandmen.

A sudden fall however in the price, although it be advantageous to the manufacturer, is a great injury, if not ruin, to the grower, who has been at considerable expense in raising and preparing it. Accordingly Mr. Young, in 1784, says, it was with great regret I found, that the extraordinary fall in the price of Madder of cent. per cent. had totally destroyed all the plantations, which were once so flourishing in the neighbourhood of Feversham in Kent; and was exceedingly concerned to hear, that Mr. Crowe, who had gone greater lengths, and made more spirited exertions in that culture, than any other man in England, had suffered very deeply in his property, by that ruinous decline.*

Mr. Young, in his tour through the East of England, made in the year 1770, gives a detailed account of the experiments of John Arbuthnot, Esq. of Ravensbury, on the subject of Madder, begun in the year 1765; by which it appears that a clear profit of seven guineas an acre was made by it, and that instead of exhausting, it ameliorates and cleans the soil to a great degree. But if fourteen years after this time, Mr. Crowe was obliged to give up the culture of Madder, it is probable that Mr. Arbuthnot did not find it so profitable as it was at first, when Madder sold for four pounds ten shillings the hundred weight.

If the cultivation of Madder is carried on properly in England, it will employ a great number of hands from the time harvest is over, till the spring of the year, which is generally a dead time for labourers, and hereby the parishes may be eased of the poor's rate, which is a consideration worthy of public attention.

Mr. Arbuthnot has shown by repeated experiments on Madder, that it may be cultivated profitably on soils not of extraordinary natural fertility: that good husbandry, with rich manuring will be sufficient to ensure a crop; consequently that the Madder culture may be extended over most parts of the kingdom, except on poor, stony or clayey soils: that the profit made by an application of the land during three years, is superior to that of four:

* Annals, Vol. II. p. 69.

that the crop requires the ground to be well cleaned, on account of the great difficulty of extracting root-weeds from among the fibres of the plants, which consequently would, in three years, get entire possession of the ground: that the average profit of an acre amounts to above seven guineas, under the disadvantages of first attempts and want of experience; if the soil had been naturally rich, such as old hop-grounds for instance, the profit would have been probably double: that the culture of this plant ameliorates and cleans the soil in a great degree, by the hand-hoeing, numerous horse-hoeings, and extraordinary tillage the ground receives in taking up the roots: that rich manuring is of the greatest importance: that great mischief is done to the crops by drawing plants from them: that the roots bear exact proportion to the luxuriance of the branches and leaves.

Instead of spoiling the plantations of Madder by drawing; it is much better to leave such a part of the crop, as will be wanting for a supply; taking up the plants for this purpose in the spring instead of the autumn. One acre of good Madder will yield plants enough for ten acres.

Old lay or new land is improper for this crop, on account of the wire-worm or sod-worm: such land should be thrown into one round of crops before the Madder is planted.

The best manure is farm-yard dung. Top dressings of all sorts are too small in quantity, however rich, to last with effect three years.

The land should be ploughed about fourteen inches deep; the intervals between the rows repeatedly horse-hoed with a shim, and then the plants earthed up by a double mould-board plough with expanding earth-boards: the rows also must be hand-hoed, as often as it is necessary.

The sets may be planted in rows at eighteen inches or two feet distance, and a foot asunder in the rows. The best distance will vary according to the goodness of the land. But in general the nearer the rows, the greater will be the crop; at least as near as two feet equally distant. Single rows at four feet are not half so advantageous. Two rows at four feet are almost twice as beneficial as single ones; but though two rows on a four-foot land amount in the whole to the same as equally distant at two feet, yet do they not near equal them in product; from which it should seem that the plants should be spread pretty equally over the land.*

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§ Young's Eastern Tour, Vol. II. p. 263—328.

Woad (Isatis Tinctoria). Our common Woad is a biennial plant, with a fusiform, fibrous root. Mr. Miller thus describes the cultivated plant, which however differs little from the wild one except in luxuriance.* The lower leaves are of an oblong oval figure, and pretty thick consistence, when growing in a proper soil; they are narrow at their base, but broad above, and end in obtuse roundish points; are entire on their edges, and of a lucid green. The stalks rise near four feet high, dividing into several branches, with arrow-shaped leaves, sitting close: the ends of the branches are terminated by small yellow flowers, in very close clusters. The pods are shaped like a bird's tongue, half an inch long, and one-eighth of an inch broad, turning black when ripe. It flowers in July, and the seeds ripen the beginning of September.

Mr. Miller has another species, which he names *I. dalmatica* or dalmatian Woad, from the place of its growth. The lower leaves of this are spear-shaped and crenated; those on the stalk very narrow and arrow-pointed. The stalks branch more than those of the first sort, and rise higher. The flowers are larger, and of a brighter yellow colour. The seed-vessels are shorter, and broader at the ends, which are indented. It is probably a variety of the common Woad, but no specimen of it occurring in Mr. Miller's herbarium, we cannot speak of it with certainty.

Dyer's Woad is a native of several parts of Europe, as on the coast of the Baltic and Ocean, by way-sides in Switzerland, &c.* In England, in corn fields and on the borders of them, as at New Barns near Ely, by the river Wear near Durham, &c. This makes us suspect that Woad is not an aboriginal with us, but has been naturalized by its frequent culture for dying; for, according to Linneus at least, it is a maritime plant. Yet if the plant which Pliny informs us the ancient Britons painted their bodies with be ours, which is very probable, it must be a native.†

Woad is much used by dyers for its blue colour, and it is the basis of black and many other colours.

Queen Elisabeth, as Hume words it, took offence at the smell of this herb, and issued an edict prohibiting any one to cultivate it.‡

According to Hakluyt, we were dependent upon France for it in § 1576.

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* Linn. † Eng. Bot.

‡ Hist. ch. xliv. See also Stowe's Annals. § Voy. 2. 46.

But in 1582 he says, "thus was Woad brought in, and came to good perfection, to the great loss of the French, our old enemies."*

Woad is cured by throwing it into a mill, constructed with a heavy iron ribbed roller, something like that which is used for bruising bark and other substances: by this process it is cut and bruised to a pulp. It is then laid in small heaps, pressed close and smooth; and as the crust formed on the outside cracks, it is closed again to preserve the strength of the substance. After laying about a fortnight in this state, the heaps are broken up: the outside worked into a mass, and the whole formed by the hand, and sometimes by wooden moulds, into oval balls; which are then dried on hurdles under a shed exposed to the sun. They turn black, or of a dark brown on the outside, when well manufactured; and are valued in proportion to their specific weight, and when of a purplish cast in the inside.

Woad which is propagated for use, is sown upon fresh land which is in good heart, for which the cultivators of Woad pay a large rent; they generally choose to have their land situated near great towns, where there is plenty of dressing, but they never stay long on the same spot, for the best ground will not admit of being sown with Woad more than twice; for if it is oftener repeated, the crop seldom pays the charges of culture, &c.

Those who cultivate this commodity, have gangs of people who have been bred to this employment, so that whole families travel about from place to place, wherever their principal fixes on land for the purpose; but these people go on in one track, just as their predecessors taught them; nor have their principals deviated much from the practice of their ancestors, so that there is a large field for improvement, if any of the cultivators of Woad were persons of genius, and could be prevailed on to introduce the garden culture so far as it may be adapted to this plant; this I know from experience, having made numbers of trials in the culture of this plant, therefore I shall insert them here for the benefit of those who may have ingenuity enough to strike out of the old beaten track.

As the goodness of Woad consists in the size and fatness of the leaves, the only method to obtain this, is to sow the seed upon ground at a proper season, and allow the plants proper room to grow, as also to keep them clean from weeds; which, if permitted to grow, will rob the plants of their

* Voy. 2. 161. edit. 1599.

nourishment. The method practised by some of the most skilful kitchen-gardeners in the culture of Spinach, would be a great improvement to this plant, for some of them have improved the round-leaved Spinach so much by culture, as to have the leaves more than six times the size they were formerly; and their fatness has been in the same proportion, upon the same land, which has been effected by thinning the plants when young, and keeping the ground constantly clean from weeds. But to return to the culture of Woad.

After having made choice of a proper spot of land, which should not be too light and sandy, nor over stiff and moist, but rather a gentle hazel loam, whose parts will easily separate: the next is to plough this up just before winter, laying it in narrow high ridges, that the frost may penetrate through the ridges, to mellow and soften the clods; then in the spring plough it again crossways, laying it again in narrow ridges; after it has lain some time in this manner, and the weeds begin to grow, it should be well harrowed to destroy them; this should be twice repeated while the weeds are young, and if there are any roots of large perennial weeds, they must be harrowed out, and carried off the ground. In June the ground should be a third time ploughed, when the furrows should be narrow, and the ground stirred as deep as the plough will go, that the parts may be as well separated as possible; and when the weeds appear again, the ground should be well harrowed to destroy them. Towards the end of July, or the beginning of August, it should be ploughed the last time, when the land should be laid smooth, and when there is a prospect of showers, the ground must be harrowed to receive the seeds, which should be sown either in rows with the drill plough, or in broad-cast, after the common method; but it will be proper to steep the seeds one night in water before they are sown, which will prepare them for vegetation: if the seeds are sown in drills with a plough, they will be covered by an instrument fixed to the plough for that purpose; but those which are sown broad-cast in the common way, must be well harrowed in. If the seeds are good, and the season favourable, the plants will appear in a fortnight, and in a month or five weeks after will be fit to hoe: the sooner this is performed when the plants are distinguishable, the better they will thrive, and the weeds being then young, will be soon destroyed. The method of hoeing these plants is the same as for Turneps, with this difference only, that these plants may not be thinned so much; for

at the first hoeing, if they are separated to the distance of three or four inches, and at the last to six inches, it will be space enough for the growth of the plants; if this is carefully performed, and in dry weather, most of the weeds will be destroyed: but as some of them may escape in this operation, and young weeds will arise, the ground will be a second time hoed in October, always choosing a dry time for this work; at this second operation, the plants should be singled out to the distance they are to remain. After this the ground will be clean from weeds till the spring, when young weeds will come up, therefore about a fortnight in April will be a good time to hoe the ground again, when the weeds will be young, and it may be performed in less than half the time it would require if the weeds were permitted to grow large, and the sun and wind will much sooner kill them; this hoeing will also stir the surface of the ground, and greatly promote the growth of the plants; if it is performed in dry weather, the ground will be clean till the first crop of Woad is gathered, after which it must be again well cleaned; if this is carefully repeated, after the gathering of each crop, the land will always lie clean, and the plants will thrive the better. The expence of the first hoeing will be about six shillings per acre; and for the after-hoeings half that price will be sufficient, provided they are performed when the weeds are young; for if they are suffered to grow large, it will require more labour, nor can it be so well performed; therefore it is not only the best husbandry to do this work soon, but it will be found the cheapest method; for the same number of men will hoe a field of ten acres three times, when it is performed while the weeds are young, as is required to hoe it twice only, because the weeds have longer time to grow between the operations.

If the land in which the seed is sown, should have been in culture before for other crops, so not in good heart, it will require dressing before it is sown, in which case rotten stable dung is preferable to any other; but this should not be laid on till the last ploughing before the seeds are sown, and not spread but as the land is ploughed, that the sun may not exhale the goodness of it, which in summer is soon lost, when spread on the ground. The quantity should not be less than twenty loads to each acre, which will keep the ground in heart till the crop of Woad is spent.

The time for gathering the crop is according to the season, but it should be performed as soon as the leaves are fully grown, while they are perfectly

green; for when they begin to look pale, great part of their goodness is over; for the quantity will be less, and the quality greatly diminished.

If the land is good, and the crop well husbanded, it will produce three or four gatherings, but the two first are the best; these are commonly mixed together in the manufacturing of it, but the after-crops are always kept separate; for if these are mixed with the other, the whole will be of little value. The two first crops will sell from twenty-five to thirty pounds a ton; but the latter will not bring more than seven or eight pounds, and sometimes not so much. An acre of land will produce a ton of Woad, and in good seasons near a ton and a half.

When the planters intend to save the seeds, they cut three crops of the leaves, and then let the plants stand till the next year for seed; but if only one crop is cut, and that only of the outer leaves, letting all the middle leaves stand to nourish the stalks, the plants will grow stronger, and produce a much greater quantity of seeds.

These seeds are often kept two years, but it is always best to sow new seeds when they can be obtained. The seeds ripen in August; when the pods turn to a dark colour, the seeds should be gathered; it is best done by reaping the stalks in the same manner as Wheat, spreading the stalks in rows upon the ground, and in four or five days the seeds will be fit to thresh out, provided the weather is dry; for if it lies long, the pods will open and let out the seeds.

There are some of the Woad planters who feed down the leaves in winter with sheep, which is a very bad method; for all plants which are to remain for a future crop, should never be eaten by cattle, for that greatly weakens the plants. It is said that it cures the rot in sheep.

The modern French Chemists contend, that as true an Indigo may be made from this plant, as from the Indigofera of India.

Weld (Reseda Luteola). This plant is not uncommon in a wild state in pastures, fallow fields, waste places, and on dry banks and walls. Mr. Swayne observes, that it is one of the first plants which grow on the rubbish thrown out of coal-pits. It flowers in June and July.

The root and bottom leaves are formed from the fallen seeds before winter; and thus it happens in this, as in many other cases, that the wild plant is biennial, whilst the cultivated plant, growing from seeds sown in the spring, is annual.

It is an observation of Linneus's, that the nodding spike of flowers follows the course of the sun, even when the sky is covered; pointing towards the east in the morning, to the south at noon, westward in the afternoon, and to the north at night.

Cattle do not eat this plant, except that sheep sometimes crop it. Dyers make considerable use of it; for it affords a most beautiful yellow dye for cotton, woollen, mohair, silk and linen. Blue cloths are dipped in a decoction of it, in order to become green. The yellow colour of the paint called Dutch Pink is obtained from this plant. The entire plant, when it is about flowering, is pulled up for the use of the dyers, who employ it both fresh and dried.

From actual experiment Mr. Marshall is of opinion, that Weld may be raised with considerable profit in Norfolk; especially during the time of war, when it is extremely dear. But he is also clearly of opinion, that it can never be for the interest of landlords to encourage the culture of this plant, without some rigid restrictions in their leases, to prevent tenants from carrying off such a large quantity of vegetable matter, without laying on a proper quantity of manure, as in the usual covenants relative to hay and straw: for it is not the corn only, but the straw likewise, that may be said to be carried off in the shape of Weld; perhaps to the amount of a ton or upwards on each acre.*

Morus (Mulberry). There are two kinds, the White and Black, that are cultivated for the sake of the silkworm: but it is the White Mulberry which is commonly cultivated for its leaves to feed silk-worms in France, Italy, &c. In Spain, as the Rev. Mr. Townsend informs us,† they prefer the White Mulberry in Valencia, and the Black in Granada. The Persians generally make use of the latter, and Mr. Miller was assured by a gentleman who had made trial of both sorts of leaves, that the worms fed with the Black Mulberry produced much the best silk: but that the leaves of the black should never be given to the worms after they have eaten for some time of the white, lest they should burst.

Sir George Staunton says that the trees he observed in China did not appear to differ from the common Mulberry-trees of Europe; that some of them were said to bear white, and some red or black fruit, but that often

* Rural Econ. of Norfolk, Vol. II. 26. † Travels, Vol. III. 264.

they bore none; and that the tender leaves growing on young shoots of the black Mulberry are supposed to be the most succulent.*

Mr. Evelyn remarks, that the leaves of the White Mulberry are far more tender than those of the Black, and sooner produced by at least a fortnight. Nor is this tree less beautiful to the eye than the fairest Elm, and is very proper for walks and avenues. The timber will last in water as well as the most solid Oak, and the bark makes good and rough bast-ropes.†

The White Mulberry, and the Silkworm were unknown to Theophrastus and Pliny. About the year of Christ 551, two Persian monks, employed as missionaries in some of the Christian churches established in India, penetrated into the country of the Seres, or China. There they observed the labours of the Silk-worm, and became acquainted with the art of working up its productions into a variety of elegant fabrics. They explained to the Greek Emperor at Constantinople these mysteries, hitherto unknown, or very imperfectly understood in Europe; and undertook to bring to the capital a sufficient number of these wonderful insects. This they accomplished by conveying the eggs of the silk-worm in a hollow cane. They were hatched by the heat of a dunghill; they were fed by the leaves of a wild Mulberry-tree, and they multiplied and worked in the same manner as in those climates where they first became objects of human attention and care. Vast numbers of these insects were soon reared in different parts of Greece, particularly in the Peloponnesus. Sicily afterwards undertook to breed silk-worms with equal success, and was imitated, from time to time, in several towns of Italy. In all these places extensive manufactures were established, with silk of domestic production.

From the reign of Justinian, it was mostly in Greece, and some of the adjacent islands, that silk-worms, which he first introduced into Europe, were reared.

Soon after the conquest of Constantinople by the Venetians in 1204, they attempted the establishment of the silk manufacture in their dominions; and in a short time the silk fabrics of Venice vied with those of Greece and Sicily.

About the beginning of the fourteenth century the Florentine manufactures of silk appear to have been very considerable.‡

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* Embassy, Vol. II. 420. † Sylvia, B. II. ch. i. ‡ Robertson's India, p. 89. from Procopius—also p. 110. See Gibbon's Hist. Vol. IV. p. 71. under Justinian.

It came much later into France; the manufacture of silk, though much encouraged by Henry IV. not having been fully established there, till under Louis XIV. by Colbert.* In England, it is well known, that all the endeavours of James I.† to raise Mulberry-trees, and make silk, utterly failed, and have never since been revived to any extent.

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* Evelyn, B. II. c. i.

† *Part of King James's Letter to the Lord Lieutenant of each County in England.*

James Rex,

"We have conceived as well by the discourse of our own reason, as by information gathered from others, that the making of silk might as well be effected here, as it is in the kingdom of France, where the same has of late years been put in practice; for neither is the climate of this isle so far distinct or different in condition from that country, especially from the hither parts thereof, but that it is to be hoped, that those things, which by industry prosper there, may by like industry used here, have like success; and many private persons, who for their pleasure have bred of those worms, have found no experience to the contrary, but that they may be nourished and maintained here, if provision were made for planting of mulberry-trees, whose leaves are the food of the worms: and therefore we have thought good hereby to let you understand, that although in suffering this invention to take place we do shew ourselves somewhat an adversary to our profit, which is the matter of our customs, for silk brought from beyond seas will receive some diminution; nevertheless, when there is a question of so great and public utility, to come to our kingdom and subjects in general, and whereby (besides multitudes of people of both sexes and all ages) such as in regard of impotency, are unfit for other labour, may be set on work, comforted and relieved, we are content that our private benefit shall give way to the public.

"And therefore being persuaded, that no well affected subject will refuse to put his helping hand to such a work, as can have no other private end in us, but the desire of the welfare of our people; we have thought good in this form only to require you, as a person of the greatest authority in that county, and from whom the generality may receive notice of our pleasure, with more conveniency than otherwise, to take occasion, either at the quarter sessions, or at some other public place of meeting, to persuade and require such as are of ability, to buy and distribute in your county, the number of ten thousand mulberry-plants, which shall be delivered to them at the rate of three farthings the plant, or at six shillings the hundred, containing five score plants.

"And because the buying of the said plants, at this rate, may at the first seem chargeable to our said subjects, (whom we would be loth to burthen) we have taken order, that in March or April next, there shall be delivered at the said place a good quantity of mulberry-seeds, there to be sold to such as will buy them; by means whereof, the said plants will be delivered at a smaller price than they can be afforded, being carried from hence: having resolved also in the mean time, that there shall be published in print, a plain instruction and direction, both for the increasing the said mulberry-trees, the breeding of the silk-worms, and all other things needful to be understood for the perfecting of a work every way so commendable and profitable, as well to the planter, as to those that shall use the trade.

"Having now made known unto you the motives, as they stand with public good, wherein every man is interested, because we know how much the example of our own deputy-lieutenant and justices will further this cause, if you and your other neighbours will be content to take some good quantities hereof, to distribute upon your own lands; we are content to acknowledge thus much more in this direction of ours: that all things of this nature, tending to plantations, increase of science, and works of industry, are things so naturally pleasing to our own disposition, as we shall take it for an argument of extraordinary affection towards our person, besides the judgment we shall make of the good dispositions in all those that shall express, in any kind, their ready minds to further the same, and shall esteem it that in furthering the same, they seek to further our honour and

The difference which Linneus sets down between the Black Mulberry and the White is, that in the former the leaves are subquinquelobate, bluntish, and rugged, in the latter undivided and shining; the fructification of the former dioecous, of the latter monoecous. These distinctions however are not exact. The Black Mulberry is a larger stronger tree; and the fruit is a dark blackish red and more acid.

Mr. Miller's account is, that the Black Mulberry has generally male flowers or catkins on the same tree with the fruit, but it often happens that some of the trees which are raised from seeds have mostly male flowers and produce no fruit; and that he has observed some trees which produced only catkins for many years after they were planted, afterwards have become fruitful. This latter observation agrees with a general remark that I have made on monoecous trees, that whilst they are young they bear male flowers chiefly and very little fruit. Mulberry-trees of a certain age are not only more fruitful than young ones, but their fruit is much larger and better flavoured.

This tree grows naturally in Persia, whence it was first brought to the southern parts of Europe. It is now become common in every part of our continent, where the winters are not very severe. In the northern parts of Sweden it will not live in the open air; and in several parts of Germany it is planted against walls, and treated in the same way as Peaches and other tender fruits are here.

It was cultivated here in 1596, by Gerarde. In some of the old kitchen gardens near London there are trees of a very great age, which are very healthy and fruitful, and their fruit is larger and better flavoured than those of younger trees. Bradley says, that most of these were planted in the time of King James I., when there was a project of setting up a silk manufacture in England.

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contentment, having seen in few years past, that our brother the French king hath, since his coming to the crown, both began and brought to perfection, the making of silks in his country, where he hath won to himself honour, and to his subjects a marvellous increase of wealth, would account it no little happiness to us, if the same work, which we began among our people, with no less zeal to their good, than any prince can have to theirs, might in our time produce the fruits which there it hath done.

"Wherefore we nothing doubt but ours will be found as tractable, and apt to further their own good, now the way is shewn them by us their sovereign, as those of France have been to conform themselves to the direction of their king.

"Given under our signet, at our palace of Westminster, the 16th of November, in the sixth year of our reign of England, France and Ireland, and of Scotland the two and fortieth."

The trees which are designed to feed silkworms, should never be suffered to grow tall, but rather kept in a sort of hedge: and instead of pulling off the leaves singly, they should be sheared off together with their young branches, which is much sooner done, and is not so injurious to the tree.

It is surprising that this precept of Mr. Miller's has not been attended to, not only in England, but in many of the southern parts of Europe, where making silk is of some consequence, since the practice is followed in the East, and is in itself perfectly rational. Father Loureiro informs us, that in Cochinchina they root up the plants every third year, and make fresh plantations of the cuttings, because the young shoots afford a more delicate food for the worms, and produce a finer silk. Sir George Staunton relates that in a part of China through which the Embassy passed, Mulberries were cultivated and reared with the greatest care; and planted in rows, ten or twelve feet asunder, in beds of a moist, but not inundated loamy earth, thrown about a foot high above the surface. The trees are frequently pruned or dwarfed, in order to make them produce a constant succession of young shoots, and tender leaves.* Our planters recommend a dry soil for the Mulberry; but it appears from the authors just quoted that in China and Cochinchina, it is cultivated in a very moist one, by the sides of rivers, or where rice is grown in trenches between the rows of trees.

There yet remains a hope, that the cultivation of silk may be successfully introduced into these realms.

The thanks of the Society of Arts were given to Mr. Sievers, of Bauenhoff, in Livonia, the Author of the following Paper, on the manner of *rearing* and *treating Silkworms* in the northern parts of Europe; and the Society, in consequence of this communication, elected him one of their corresponding Members.

Sir,

The principle that induced me to trouble you with this letter, will, I hope, serve for an apology, and gain your indulgence.

Not till late in this autumn the thirteen volumes of the Transactions of the Society for the Encouragement of Arts, Manufactures, and Commerce, came to my hands. I perused them with so much the more pleasure, as I

* Vol. II. p. 420.

remember, while in England, in my younger years, the first existence and sudden rise of this useful Society, by the public spirit of Mr. Shipley, whose name was ever since respectable to me.

I dare not intrude on your time, so usefully employed for the public good of your country, to expatiate on the many articles I most admired, but especially the encouragement of plantations, by which the Society will be the benefactor of ages to come: yet one article struck me, for its not answering the expectations and repeated laudable exertions of the Society; I mean, the cultivation of Silk and the Mulberry-tree, an object so worthy the Society's attention.

I will venture to justify the trouble I am going to give you, Sir, by this long letter, in saying something which may appear of some use on that score. You will smile to hear a man living under the 58th degree of latitude, and so much to the east as beyond the Baltic, speak of the cultivation of the Mulberry-tree and rearing of Silkworms; yet I hope to win your indulgence, perhaps your candid approbation of some of my thoughts. Many thousands of English nobility and gentry travelled, rambled, even lived, in Italy and the South of France; numbers of them I have seen and known there; but none cared to enquire about the Silkworm, and its prodigous work: amusements chiefly took up their time; of a few, antiquities, statues, paintings, of which, be it said to their honour, no nation has made so rich a harvest on the hungry Italians, preying on the wealth of the English travellers.

But to come to the Silkworms.—While I served, in the year 1758, in the Russian army, in Pomerania, particularly near the coast of the Baltic, I had the good luck, being quarter-master general of a division, to be near a considerable corn field belonging to a gentleman; this produced an acquaintance with the owner: having seen many of his plantations of Mulberry-trees, of both sorts, he told me their use, and shewed me their produce. I requested some seeds of both, and the model of a spinning wheel.

Some of the seeds were sown at a villa near St. Petersburgh, belonging to an uncle of mine; they always froze to the earth; yet in the following years would rise as high as three or four feet, in several branches, and give, with a few larger trees in the green-house, food for three thousand Silkworms, which gave near a pound of silk. But this essay had no followers, and is now no more.

Another part of the Pomeranian seed was sown next spring at my then living father's estate, where I now live, in Livonia, about eighty-five English miles north of Riga. The frosts took always half of the year's growth. They were planted in a couple of borders, and kept under the sheers, then much in use, as formerly in England. No use was made of the leaves. When I retired from public life, I found no more than forty-five trees, or rather bushes, standing in one row, two feet asunder; I transplanted every second or third tree, by which I lost three trees: I made sucklings, and have more than a hundred low standard trees by them; cuttings I never attempted, misled by a German author, who assured me they would not take.

I wrote for some seeds from Berlin, of the White Mulberry, of which I had many thousand plants: being no botanist, I am not sure they are of the White, though they have leaves much more smooth and tender than my old trees.

The seedlings rose a foot in the first year, but froze to the ground; the next they rose to two feet, of which more than a foot was lost by the next winter; so they did the third year: then I transplanted them, partly in rows in beds, one foot asunder, others in sundry places of light middling land. I gave many hundreds to several ladies, who, hearing of my Silkworms, were curious to have the plants. A lady near the town of Dorpat, near a hundred miles to the north-east, reared already a couple of thousand Silkworms, and has a shawl embroidered with her own silk of natural colours. Those planted in rows and beds were, after two years, planted for good, in different places, even in the field; of these, having no shelter, some have suffered more than those which were protected by buildings or other trees.

I made no use of my Mulberry-leaves, till five yeare ago. Travelling in White Russia, or to be more explicit, in the Government of Polotzk, on the borders of the River Duna, about one hundred and fifty miles to the east of Riga, consequently somewhat colder, I found some ladies ruffling cocoons, having, as they said, no spinning-wheel; the cocoons were spun there the same summer. The mother of these ladies being from the southern borders of former Poland, had brought young Mulberry-trees from thence, which I saw thrive very well, being standard trees of above fifteen feet high, and, near the ground, of about three inches thick.

They gave me a sheet of paper with some eggs; the next year I had

near three thousand worms spinning. A German pamphlet from Berlin served me for instruction, and to make a spinning-wheel, for my Pomeranian model was lost. I had such a great call for cocoons, that, instead of near a pound, which I might probably have had, I got but ten ounces of Silk, taking eight or nine cocoons to a thread. I sent some of the Silk to her Imperial Majesty, of glorious memory, she being a great promoter of all sorts of industry. I received a most gracious letter of thanks from her hand: I sent likewise some Silk to the Society of Economy at Petersburg, whose President, Count Anhalt, wrote to me a letter of thanks and approbation. For myself, I got a pair of knitted white silk stockings, having no loom for weaving in this neighbourhood.

The two following years abut the same number were reared, though more might have been so. The sucklings of my old trees transplanted beginning to give a pretty deal of leaves, this year I expected to have had eight thousand; but being obliged to make a journey in the beginning of May to the southern parts of Russia, beyond Kiovia, which journey took up the whole summer, the young lady I intrusted with rearing my Silkworms, full of eagerness for the trial, exposed the sheets with the eggs to the sun too soon, when the leaves had scarce begun to break. Overjoyed at the prodigious number that crept out, she forgot my prescription, and counted more than sixteen thousand at the onset; but the trees were then almost bare of leaves; she could not resolve to throw one half away, to save the other; so most of the poor Silkworms died, and scarce two thousand remained, which gave much smaller cocoons than in the former years. I am even in danger of losing my old trees, for they seem weakened by being stripped too much. Most of my old trees, which are rather bushes of about six, seven, or eight feet, branching from the ground, are of the black sort, bearing very small fruit, much smaller than in England: but those I take to be such, because they suffer somewhat more by the frosts, and the little creatures eat their leaves more eagerly than from the others.

No insects I ever observed on either: the Rev. Mr. Swayne's remarking some earwigs, is a phænomenon I never heard of in Italy, nor this summer at Kiovia, nor have I found it in any book.

From these premises, Sir, we may perhaps venture to draw the following outlines of what might be proper to come nearer to the useful and extensive aim of the Society.

1. That the White Mulberry-tree is the only one that will produce Silk. The quotation, page 191, in your tenth volume, of Mr. Hanway's Travels, a man of known veracity, I can assure to be true, by what I have heard of a gentleman who lived many years at Astrachan, and had connexions with the Armenians, who are the principal traders with Persia and Persian Silk, an article increasing yearly, for the use of the manufactures at Moscow. The Persian Silkworms, as those in Italy and the south of France, feed most certainly on the White Mulberry leaves alone. This is confirmed by the ingenious and indefatigable Mr. Arthur Young, in his Travels in the south of France and Lombardy, as quoted by Mr. Swayne, which I have read in his works; and Mr. Bertezen affirms the same; while what he gives as his own opinion is evidently fallacious, if not set forward on purpose to mislead. No doubt the Worms will live on the Black, but will not thrive, nor give any other but indifferent Silk. I therefore think, that for a complete establishment and producing Silk, this being the laudable aim of the Society, the White Mulberry alone should be raised, using the Black, existing of old in England, for its fruit, only as a necessitous nourishment, degrading the quality and value of the Silk. As a further proof I must add, that the Oragazine Silk, the best Europe produces, owes its excellence to the particular kind of White Mulberry-trees, of which the branches are grafted on those raised from seed. I remember to have heard, and even read somewhere, that they get, by way of smuggling, the branches to France, to graft the trees in Provence, Dauphiné, and Languedoc: premiums will bring them as certainly to England.

2. That the White Mulberry-tree will thrive most certainly in England and Wales, and even in Scotland as far as Edinburgh, as a middling standard-tree. The Black and the White will do, though this less flourishingly, as far as the most northern coasts of Scotland, perhaps not as a standard-tree, but certainly as a large bushy shrub, as my old trees are here. My trees, from sucklings and seeds, are trained as small standard-trees, the stem or trunk only four or three feet. To judge by the latitude, the White Mulberry will thrive in Ireland as well as in England; but the seeds should not be taken from France nor Italy, nor any warmer clime. I would propose to get them by Stetten from Pomerania, and from Berlin; nay, I have been assured some may be had from Koningsberg in Prussia: care must be taken to distinguish the two sorts. The White one may be got too from Dresden

and Leipzig; the seed of the Black in England will do for the northern parts of England; but for Scotland I should rather obtain them from Pomerania and Prussia.

3. That the seeds should be sown in plain but light garden-land, rather somewhat sandy, without any dung whatever. The Rev. Mr. Swayne, in your tenth volume, guesses right when he attributes the loss of his plants to the dung.

4. That I doubt the mode of cuttings to multiply the Mulberry-tree. I will make, next spring, a trial in the open air, and in a green-house without heat; yet I think it likely to fail; but to raise plants from Seeds seems more eligible, especially if taken from a northern clime, as proposed above.

5. That, to all those that will undertake to raise Silkworms, an excessive cleanliness should be recommended: no draught of air, no smoke, damp vapour, or exhalation whatever, should come near them; nor even a sickly person approach them.

6. That no sun-shine, but only a temperate or broken light, should come upon them; the heat of the room should be between twelve and fifteen of Reaumur: airing more than once, especially in the morning, is necessary. The room should have shutters, to secure them from the effect of thunder and lightning; consequently the bringing them into the air, as proposed by the Rev. Mr. Swayne, I dare not adopt; besides, the carrying the apparatus into the garden, and back into the house, is an unnecessary labour, requiring hands. The apparatus is really a good one, resembling some I have seen formerly in Italy, and this last summer beyond Kiovia, at two estates of Field-Marshal Count Rasoumouzky, who has Mulberry plantations. I got this summer about twenty pounds of pretty good Silk.

7. That the rearing of Silkworms will take no labourer from the field, nor from any manufacture: it will employ only an elderly woman and a couple of children, of twelve, thirteen, or fourteen years of age, the gathering of the leaves excepted, which will employ one lad of fifteen; all these will rear thirty thousand Worms, or more, in the term of six or seven weeks, producing ten pounds of Silk.

8. That for the Mulberry-tree no good land is required, but such as will grow the most common trees on dry land; nay, I will venture to assert, they will grow on Blackheath, on Hounslowheath, on Finchley Common, and even on the barren Marlborough Downs. To these hints I must add,

for the further encouragement of industry, that I found, this summer, at Kiovia, a poor taylor, a native of Upper Silesia, who having a small house overagainst the Mulberry-Garden planted by PETER THE GREAT, and having seen the rearing of Silkworms in his native country, began three years ago to rear some with the leaves of that Garden. Last year he delivered twenty-five pounds of Silk to the Director of the Imperial Garden there, who paid him, by order of the Empress, ten rubles a pound. I visited him as a man of desert: I found his house, about twenty feet square, partitioned into four small rooms; in the corner of one of these I found a dozen sacks, of about three bushels each, filled with as large and fine cocoons as I have seen in Italy, and much finer than my own; of these this industrious man hoped to get thirty pounds of Silk. Except the men and boys he employed to gather the leaves, he had for his work to take care of his Worms, whose number he rated to be near a hundred thousand, no more help than his wife, an elderly woman, and three children, of twelve, thirteen, and fourteen years of age.

As another proof how encouragement raised industry in a similar object, I must add, that in the Prussian dominions Mulberry-trees were planted by order of Frederick William, father to Frederick II. A few hundreds of pounds of Silk were made yearly. This last King neglected the object in the first twelve years of his reign; the years 1750, 1751, and 1752, produced together no more than one hundred and fifty pounds. Count Hertzberg got the care of it. Though taken up with ministerial affairs, he found the object so interesting, encouraged the same with such zeal, gave even medals out of his own pocket, that an incredible augmentation ensued. In the year 1794, when he died, fourteen thousand pounds of Silk were delivered into the Berlin manufacture, proved to be Prussian Silk. Great Britain and Ireland would outdo them very soon, if steps were taken to procure Mulberry seeds and plantations, and that the known public spirit of the Nation would turn its attention to that object, and make it a national one.

As a third and last proof, permit me, Sir, to add, that the late Empress, hearing that some Mulberry-trees, planted by Peter the Great, on an island in the Wolga, near Czaritzin, were grown to a great height, and augmented by nature, she placed there a colony of Russians, to the number of four hundred males (the place called Achtouba); gave them ten years exemption

from imposts, after which they were to pay their capitation and imposts in Silk, at ten rubles per pound. The first Ribbon of the newly instituted military Order of St. George, was of that produce; and though the same was coarse, she said, smiling, she never wore a finer to her mind. From the Silkworms produce, give me leave, Sir, to say a few words of a plant which seems to be akin to them; it is the *Asclepias Syriaca*, mentioned in Miller's, Mawe's, and Abercrombie's Dictionaries, as a perennial plant in England: I found it this summer in an apothecary's garden in Kiovia; and was surprised to observe its produce so much resembling the Silk; and that in Upper Silesia manufacturers exist that cultivate this plant, and spinning its sort of Silk with cotton, produce a silky stuff. According to a calculation I have seen, half an acre will produce, in the third year, the value of ninety rix-dollars, and so on. Here I must conclude; but, with a heart full of grateful feelings to a happy country, where I passed seven of my younger years. Being attached to the Russian embassy, I shall hope on some future occasion to ask you a few questions, that may perhaps prove not unworthy the attention of your truly patriotic Society.

I have the honour to remain, Sir,

Your most obedient Servant,

J. SIEVERS.

SAMUEL MORE, ESQ.

Secretary to the Society for the Encouragement of Arts, Manufactures, and Commerce.

Morus (MORUS PAPYRIFERA). This tree makes very strong vigorous shoots, but seems not to be of tall growth, for it sends out many lateral branches from the root upwards. The leaves are large, some of them entire, others deeply cut into three or five lobes, especially whilst the trees are young; they are a dark green, and rough to the touch on the upper surface, but pale green and somewhat hairy on the under side, falling off on the first approach of frost in autumn. The fruit is little larger than peas, surrounded with long purple hairs, when ripe changing to a black-purple colour, and full of sweet juice.

It is a native of Japan and the South Sea islands, according to Mr. Miller of China also and South Carolina, whence he received the seeds. The inhabitants of Japan make paper of the bark. They cultivate the trees for this purpose on the mountains much after the same manner as Osiers are

cultivated with us, cutting down the young shoots in December, after the leaves are fallen.

These being divided into rods of three feet in length, or shorter, are gathered into bundles to be boiled. If the shoots are dry, they must be softened in water twenty-four hours. The bundles are boiled very close together, and placed erect in a large copper properly closed: the boiling is continued till the separation of the bark displays the naked wood. Then the stalks are loosed out of the bundles, and allowed to cool; after which, by a longitudinal incision, the bark is stripped off, and dried, the wood being rejected. When this bark is to be purified, it is put three or four hours in water, when being sufficiently softened, the cuticle, which is of a dark colour, together with the greenish surface of the inner bark, is pared off. At the same time the stronger bark is separated from the more tender: the former making the whitest and best paper; the latter a dark weak and inferior kind. If any bark appears that is old, it is set aside for a thicker paper, of worse quality. Into this last class they throw the knotty parts of the bark, and those which have any fault or blemish.

The bark is now boiled in a lye that is clear and strained; care being taken to stir the substance as soon as it begins to boil, with a strong reed, and to pour in of the lye gradually as much as is necessary for stopping the evaporation, and restoring the liquid that is lost.

The boiling is to cease when the materials can be split, by a slight touch of the finger, into fibres and down.

Next it is to be washed, which is a thing of some moment; for if washed too short a time, the paper will be strong indeed, but too rough, and of an inferior quality: if too long, it will be whiter, but of a fat consistence, lax, and less fit for writing. Being sufficiently washed, the materials are put upon a thick, smooth, wooden table, and stoutly beat, by two or three men, with battons of hard wood, into a pulp; which being put in water, separates like grains of meal. Thus prepared, it is put into a narrow vat; an infusion of Rice, and a mucous water of the infusion of the root of Manihot being added to it. These three are to be stirred with a clean slender reed, till reduced into a homogeneous liquor, of a due consistence. The prepared liquor is now put into a larger vat; from whence the sheets are poured out one by one, and placed in heaps upon a table covered with a double mat; a small thread of reed being placed between the sheets at the edge, and

projecting a little, so that they may be taken up singly when wanted; the heaps are covered with a plank of wood the size of the paper, upon which stones are put, at first of a light weight, but afterwards heavier, that all the wet may be pressed out by degrees. The following day each sheet is taken out by itself, and the operation is finished.*

The finest and whitest cloth, worn by the principal people at Otaheite and in the Sandwich islands is made of the bark of this tree: and when dyed red, takes a good colour. The juice of the Paper Mulberry is used in China as a glue in gilding either paper or leather, but not wood.

It was cultivated before 1759, by Hugh Duke of Northumberland,† in whose gardens several of these trees were raised from seeds a few years past, and one of them was given to Mr. Miller.

If the Paper Mulberry, says Professor Martyn, should be found too tender for our climate, might not our common Mulberry be cultivated for this purpose, and be made to throw out shoots tender enough to be converted into paper, by the process used in Japan?

Having detailed the more striking examples of useful foreign plants, that either are, or may be, naturalized to our climate, let us descend to mention some, which are commonly seen to adorn and decorate our gardens. Many of these yet retain the names of the countries whence they were derived. Thus we have our *Chinese* Aster, *African* Marygold, *Portugal* Laurel, *Corinthian* Acanthus, *American* Aloe, *Indian* Cress, *Greek* Valerian, *China* Rose, *American* Cowslip, *Egyptian* Cucumber, *Virginian* Gelder-rose, *Dittany* of Crete, Ebony of the *Alps*, Grass of *Parnassus*, *French* Lavender, *Guernsey* Lily,‡ *Portugal* Mallow, Marvel of *Peru*, *Syrian*, or *Cretan* Marum, *American* Night-shade, *London* Pride, *Tangier* Pea, Pellitory of *Spain*, *Hottentot* Cherry, *Scotch* Pine, *Weymouth* Pine, *China* Rose, *African* Ragwort, *Canada* Judas-tree, *Virginian* Snake-root, Rose of *Jerico*, *African* Spiræa, Star of *Bethlehem*, &c. &c. Other examples will be seen in the following Catalogue, in which will be also treated how each may be raised from *Seed*.

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* Kæmpfer. † Hort. Kew.

‡ This last is from Peru: but some of these roots being on board a vessel which was stranded there, they became naturalized in this island, and hence its present appellation.

SECT. XXXVI.

CATALOGUE RAISONNÉ

OF

HARDY TREES, SHRUBS, HERBS, AND FLOWERS.

Could NATURE's bounty satisfy the breast,
The *Sons of Albion* were supremely blest.
Whatever fruits in different climes are found
That proudly rise, or humbly court the ground;
Whatever blooms in other tracts appear,
Whose bright succession decks the varied year:
Whatever sweets salute the northern sky
Which vernal lives, and blossoms but to die:
These, here disporting, own a kindred soil,
And only ask at first the planter's toil;
While sea-born gales their gelid wings expand,
To winnow fragrance round the smiling land.
GOLDSMITH.

Providence having allotted to us, a situation in a temperate climate, as remote from the scorching rays of the sun of the torrid, as from the piercing colds and nipping frosts of the frozen Zone; by reason of which our soil and atmosphere, are adapted to the culture and nurture of most plants in the universe, whether from warmer or colder climates, either useful for the various purposes of life, or delightful by their beauty and variety; it would be a neglect scarce pardonable, to suffer so valuable a blessing to pass unregarded and unimproved.

SECT. I. *Deciduous Trees.*

Genus 1. *Maple.* (ACER.) Class XXIII. Polygamia. Order I. Monoecia.

Species 1. *Common* or *Small Maple.* (ACER CAMPESTRE.)

It is chiefly seen in hedge-rows and coppices, and is a native of England, and not uncommon about London. Though it cannot be called a large tree, it should not be degraded, as Linnæus has done, to a shrub, nor does it make a bad figure in a plantation. Some derive its Latin name from acre, ingenium, being employed by the most ingenious artificers in their finest works. Thus Pliny says, "Acer operum elegantia ac subtilitate Citro tantum secundum." Hence Virgil makes Evander sit upon a *Maple* throne. The timber is far superior to that of the Beech for all uses of the turner, particularly dishes, cups, trenchers and bowls; and when it abounds in knots, as it very frequently does, it is

highly esteemed by the joiners for inlaying, &c. On account also of the lightness of the wood, it is often used by musical instrument makers; from its hardness, for gun-stocks and other purposes; and from its whiteness it was formerly in great request for tables. In the vale of Gloucester, where oak timber is scarce, it is used for gate-stuff and other purposes of husbandry; and sometimes screws for cider-presses are made of this wood: but the principal value of the Maple is for underwood: it is of quick growth and affords good fuel.

Species 2. *Cretan Maple.* (Acer Creticum.)

This came originally from the Island of Crete; and was cultivated by Miller in 1752. It reaches twenty feet in height, and in sheltered situations retains its leaves nearly the whole year.

Species 3. *Montpelier Maple.* (Acer Monspessulanum.)

Its name denotes whence it came, and was cultivated by Miller in 1739. It rises to twenty feet, and continues its verdure till very late in the autumn, which renders this tree very ornamental.

Species 4. *Mountain Maple.* (Acer Montanum.)

A small tree, or rather shrub. It comes from North America, and was cultivated by Archibald Duke of Argyle, in the year 1750.*

Species 5. *Virginian Ash-leaved Maple.* (Acer Negundo.)

This species rises with us to forty feet, is a very strong shooting tree, of quick growth, and is in Virginia and Carolina one of the largest trees of this kind. It is well adapted, by its pale green leaves, so different in form from those of other species, to make a beautiful variety in woods, but they fall very soon in the autumn; and it must be planted in places not too much exposed to violent winds, being subject to split. The timber is fit for the same uses with that of the Norway Maple and Sycamore, but is soft and brittle. It was cultivated in 1688 by Bishop Compton.

Species 6. *Italian Maple.* (Acer Opalus.)

This species rises to forty feet and upwards, is common in many parts of Italy, particularly about Rome and Viterbo. It is one of the loftiest trees of that country, and is esteemed for the leaves, which are large, and afford a great shade; so that it is planted frequently there by the sides of roads, and near habitations. This tree is noticed by Linnæus, and many other modern authors. It is rarely to be met with in England, though hardy enough to bear the open air; and cultivated so long since as 1752, by Mr. Miller; as appears by the sixth edition of his admirable Dictionary. Being a noble tree, acquiring a considerable stature, and having a spreading head adorned with large and beautiful foliage, it deserves the attention of ornamental planters.

Species 7. *Pensylvanian Maple.* (Acer Pensylvanicum.)

This is a small tree, which in some situations may be considered rather as a shrub. It will grow to the height of about fifteen feet, with a slender stem, covered with a whitish bark, and sending forth several red branches. The flowers are on long pendulous racemes, of a greenish yellow colour. The seeds generally fall off before they are ripe. It is a native of Pensylvania, Virginia, and Canada, and was introduced here in 1755, by Messrs. Kenedy and Lee.

* Hort. Kew.

The Striped-bark Maple of Bartram's catalogue, is supposed to be the same with this; and so, I apprehend, is the *Acer canadense* of Gordon's. It is thus described by Lauth, in his thesis. Bark smooth, beautifully varied with green and white stripes, the boughs of a shining red in winter. Leaves nine inches long, not quite so wide. Raceme long, with flowers on simple pedicels, and distant. Divisions of the calyx, only half the width of the petals in the corolla. Stamens eight, shorter by half than the corolla. Capsules oblong, compressed, not joined in a right line, but forming an angle. The thickness of the shade, the beauty of the bark, and the tree not being liable to insects, would make it desirable for plantations, were it not for the litter occasioned by the abundance of the leaves and fruits which it produces, and its being subject to be torn by storms.*

Species 8. *Norway Maple.* (Acer Platanoides.)

Its English name denotes its country. It was cultivated first in England in 1724. The Norway Maple grows to a large size. The leaves being smooth and of a shining green, as large or larger than those of the Sycomore, and being seldom eaten or defaced, because the tree abounds in a sharp milky juice disliked by insects; they have a much better appearance than those of the Sycomore; and in the spring, when the flowers are out, which are of a fine yellow colour, this tree has great beauty.

Hanbury observes, that in the autumn the leaves die to a golden yellow colour, which produces a good effect at that season, when the different tints of the decaying vegetable world are displayed. He says farther that it is a quick growing tree, arrives at a great bulk, and is one of the best trees for sheltering habitations.

Linnæus recommends it for walks and plantations; as yielding a juice from which sugar may be made, if it be wounded in the winter; and as cutting out into a white smooth wood, fit for the stocks of guns, the joiner, and the turner. Dr. Hunter observes, that as it is a quick grower, arrives at a great bulk, and answers all the purposes of the Sycomore, the raising it for use, as well as ornament and variety, should not be neglected.†

Species 9. *Great Maple,* or *Sycomore.* (Acer Pseudoplatanus.)

It is found wild in Switzerland, Germany, Austria, and Italy, in mountainous situations. This species grows to a great height, has frequently a clean straight bole and a spreading top. It is in leaf by the middle of April; and on their first appearance the leaves are of a pleasant green, but they exude a clammy juice so abundantly, that they attract a variety of insects, which soon perforate and disfigure them. The bunches of flowers are in full blow, within a fortnight after the appearance of the leaves; but being of a herbaceous colour, they make no great appearance.

The great Maple was formerly much planted for walks and avenues, but has lately given way to better or more sightly trees. This, however, the Norway, and some of the rest, are peculiarly proper to make plantations near the sea, or to shelter other trees in that situation; for they resist the spray better than most trees. They also do less damage to grass in pastures.

An enormous tree of this sort is growing before the Duke of Dorset's seat at Knowle in Kent. It is represented in Badeslade's view of that seat, and is preserved in Dr. Harris's History of the county. It was twelve or fourteen feet in girth. The original plantations of Vauxhall and Marybone Gardens were chiefly of this tree.

Before earthen-ware came into use at the table, the wood of the great Maple, which is soft

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* Hort. Kew. † Suec.

and white, was in much request for trenchers. It is still used by the turners for bowls, dishes, &c. by the saddlers for saddle-trees; and is recommended by Evelyn as excellent for cart and plow timber, being light and tough. It is however inferior to the Ash for these purposes.

Walter Blith recommends the Sycomore as a very quick-growing and thriving wood; on warm, sound, rich land as thriving wonderfully, and rising to gallant shade, excellent to make walks and shadow-bowers, useful for inward building, where better is wanting, and for firing where wood grows scarce.

It is generally looked upon as proper for under-wood, because it shoots fast from the stool, and makes good fuel.

It is considered as a quick grower, and not of long duration, and yet there are several large, flourishing trees, some of them indeed now tending towards decay, 1792, in the Master's piece, at Sidney-Sussex College in Cambridge, which were planted there in 1607.

In spring and autumn, this species will pour forth from the wounded stem, in the same manner as the Birch, abundance of saccharine juice; from which a good wine may be made, as Mr. Ray affirms, from the information of Dr. Martin Lister.

There are two varieties of this tree common in the nurseries; one which has only broader leaves, producing a pleasing variety in the tints of large plantations.

Species 10. *Scarlet-flowering Maple.* (Acer Rubrum.)

A native of Virginia. It rises twenty feet. There are two varieties with us. Var. 1. The Virginian scarlet-flowering Maple. 2. Sir Charles Wager's Maple, with paler flowers, and in large clusters. This species was cultivated in 1655 by Mr. John Tradescant, jun.* It is propagated with us for the sake of the scarlet flowers, which come out early in the spring. In Pennsylvania, where it grows in the swamps, the natives use it for almost all sorts of wood-work; with the bark they dye a dark blue, and make a good black ink. The Canadians tap the tree for the juice, of which they make sugar and treacle.

Species 11. *American Sugar Maple.* (Acer Saccharinum.)

Rises to forty feet. Native of North America. Was introduced here in 1735 by Peter Collinson. This Tree has been noticed by us at large at p. 373.

Species 12. *Tartarian Maple.* (Acer Tartaricum.)

It is an inhabitant of southern Russia; by the Tanais, Volga, &c. The wood is whitish, with some brownish veins. The seeds are used as astringents by the Calmuc Tartars, boiled with milk and butter.†

Linnæus describes this as a lofty shrub, or rather a low tree, not exceeding twenty feet in height; with leaves like those of Hornbeam, having scarcely any apparent lobes: with flowers in racemes, as in the Great Maple, but the raceme compound, and the flowers petaloid. They appear early, and are sometimes followed by ripe seeds in our gardens. Cultivated 1759 by Mr. Philip Miller.‡

CULTURE.

The Genus Acer *Maple* consists of deciduous trees, most of them sufficiently hardy. They are easily propagated by sowing their seeds, soon after they are ripe, in a bed of common earth, covering

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* Hort. Kew. † Pallas. ‡ Hort. Kew.

them about half an inch thick with light mould. In the spring they will appear above ground, and if kept clear from weeds, and watered in dry weather, some of the sorts will grow above a foot high the first summer. The autumn or spring following, if they are close in the seed-bed, it will be proper to transplant them into a nursery, in rows at three feet distance, and two feet asunder in the rows; some say that two feet and a half by one foot and a half is sufficient; others recommend only two feet by a foot. In this situation they may remain three or four years, by which time they will be large enough to plant out for continuance.

If the seeds are kept out of the ground till spring, they rarely come up the same year, and many times do not grow. When therefore they are to be transported to any distance, it will be proper to put them up in sand or earth.

Genus 2. Æsculus. *Horse-chesnut.* Class VII. Heptandria. Order I. Monogynia.

Species 1. *Common Horse-chesnut.* (Æsculus Hipocastanum.)

This extremely ornamental tree is now sufficiently known by the beautiful parabolic form in which the branches are disposed, when the tree stands single: by its digitate leaves, composed of seven leaflets, serrate about the edge, the middle one largest, the outer ones smallest: and by its handsome, upright, pyramidal thyrses of white flowers, variegated with yellow or red towards the centre. Some of these, towards the top of the thyrse, are imperfect and abortive. The capsule, or nut, as it is commonly called, is divided internally into three cells according to Linnæus; but sometimes into two only.

This tree was in much greater esteem for avenues and walks formerly, than at present. It is come into disrepute, because the leaves decay early in the summer, so that it occasions a litter in gardens and plantations, from July till they are fallen; but notwithstanding this inconvenience, the tree has great merit, for it affords a noble shade very early; and during the time of its flowering, no tree has more beauty, for the extremities of the branches are terminated by fine spikes of flowers, so that every part of the tree seems covered with them, and being intermixed with the large digitate leaves, they make a noble appearance. There is however another inconveniency to which this beautiful tree is subject, namely, that it is does not resist stormy winds.*

In the old way of planting these trees in avenues, great part of their beauty was lost; for when their branches meet, fewer flowers are produced, and most of these are hid from sight; their leaves will also decay much sooner in close plantations than in single trees: the great beauty of them is to stand singly upon lawns, or in parks, where their fruit will be of use to the deer, who are very fond of them. In such situations, especially when they can be placed so as to terminate a view, there is not a finer object than they afford during their season of flowering, which is in May; and when the weather is moderate, they will continue in beauty near a month.

In the opinion of Mr. Gilpin, the Horse-chesnut is a heavy disagreeable tree. It forms its foliage generally in a round mass, with little appearance of those breaks which contribute to give an airiness and lightness, at least a richness and variety to the whole mass of foliage. This tree is however chiefly admired for its flower, which in itself is beautiful: but the whole tree together in flower is a glaring object, he says, totally unharmonious, and unpicturesque. In some situations indeed, and among a profusion of other wood, a single Horse-chesnut or two, in bloom, may be beautiful. As it forms

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* Evelyn.

an admirable shade, it may be of use in thickening distant scenery; or in skreening an object near at hand: for there is no species of foliage, however heavy, nor any species of bloom, however glaring, which may not be brought, by some proper contrast, to produce a good effect.*

Few trees make a greater progress than this. I have known some raised from nuts, which in twelve or fourteen years were large enough to shade two or three chairs under the spread of their branches, and were covered with flowers. There are many old trees now standing, which having been planted singly, are grown to a large size, their heads forming a fine natural parabola. I have measured some of them, whose branches have extended more than thirty feet, and their heads have been so close as to afford a perfect shade in the hottest seasons. These were planted in 1679; so that although they are of quick growth, yet they are not of short duration.

As the wood is of little value, this tree should not however be propagated in too great plenty; but a few of them only placed at proper distances in parks, for ornament, and for the deer, who keep much about them in windy weather, watching the falling of the nuts, and greedily devouring them as they fall. In Turkey, the nuts are ground, and mixed with the provender for their horses, especially those which are troubled with coughs or are broken winded.

Hanbury affirms, that swine will fatten on them; while others on the contrary assert that they are so bitter, that even hogs will not eat them, either raw, boiled or baked. Haller relates, that sheep have been fed with the nuts whole, and have done very well with them: and that poultry have been kept with them boiled. He also observes, that having a saponaceous quality, they may be used to spare soap in washing: and that the bark of the tree has been given in Italy not without success, in intermittent fevers. This bark has also been used with good profit, in dying several sorts of yellow colours.

The timber, though of inferior quality, does not merit the character that Mr. Miller gives of it, namely, that it is not fit even for burning, nor any other use that he knows of. Mr. Boutcher, though he affirms that the timber, except for fuel, answers no valuable purpose; yet allows that for pipes, to convey water under ground, it will last longer than many harder woods. Dr. Hunter informs us, that it is chiefly used by the turner, and in the north is worth about sixpence a foot. And Mr. Hanbury not only admits it to be useful for most sorts of turners' ware; but that as the tree grows to a great magnitude, it sells at such a price, as to make it well worth the planting, for the sake of timber. He prescribes the felling to be performed in November or December.

The Horse-chesnut was brought from the northern parts of Asia into Europe about the year 1550, and was brought to Vienna about the year 1558. From Vienna it migrated into Italy and France: but it came to us from the Levant immediately.† Gerard, in his herbal,‡ speaks of it only as a foreign tree. In Johnson's edition of the same work,§ it is said, Horse-chesnut groweth in Italy, and in sundry places of the East countries: it is now growing with Mr. Tradescant at South Lambeth. Parkinson‖ says, our Christian world had first the knowledge of it from Constantinople.

The same author¶ places the Horse-chesnut in his orchard, as a fruit-tree, between the Walnut and the Mulberry. How little it was then (1629) known, may be inferred from his saying not only that it is of a greater and more pleasant aspect, for the fair leaves, but also of as good use for the fruit, which is of a sweet taste, roasted and eaten as the ordinary sort. He also describes and figures the corolla with four petals.

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* Forest Scenery, Vol. I. p. 62. † Evelyn. ‡ Printed in 1597.
§ Printed in 1633. ‖ Theat. printed 1640. ¶ Parad. p. 595.

This tree does not seem to have been so common even at the beginning of the present century as it is now. Mr. Houghton (1700) mentions some at Sir William Ashhurst's at Highgate, and especially at the Bishop of London's at Fulham. Those now standing at Chelsea-college were then very young. There was also a very fine one in the Post-house garden near Old Street, and another not far from the Ice-house under the shadow of the Observatory in Greenwich Park.*

Species 2. *Yellow-flowered Horse-chesnut.* (Æsculus Flava.)

Native of North Carolina, and was cultivated by Mr. John Greening. It flowers in May and June.

Species 3. *Scarlet Horse-chesnut.* (Æsculus Pavia.)

It rises to the height of twenty-feet, but does not spread its branches to any great extent. The bark is smooth. The leaves are of a light green, opposite, and on long red petioles. The flowers are produced from the ends of the branches, upon long naked peduncles, each sustaining four or five flowers; these are much smaller than in the common sort, wholly red, tubulous without any borders, opening a little at the top, where the stamens appear, seven or eight in number. They appear in June, and are sometimes succeeded by fruit in England; but the seeds rarely ripen here.† It grows naturally in Brazil, Carolina, Florida, Japan, and several parts of the East; and was cultivated here in 1712.‡

CULTURE.

The Common Horse-chesnut is propagated by sowing the nuts; the best time for doing this is early in the spring; but the nuts should be preserved in sand during the winter, otherwise they are apt to grow mouldy and rot. They may indeed be put into the ground in autumn, but then they will be in danger of rotting, if the winter should prove very wet, as also of being disturbed and eaten by vermin. Others however affirm, that if they are kept till spring, many will miscarry.

When the nuts succeed, and have a proper soil, the plants will shoot near a foot the first summer; so that where they grow pretty close together, it will be proper to transplant them the following autumn, or February and March,§ planting them in rows at three feet distance, and one foot asunder in the rows: in this nursery they may remain two years, by which time they will be fit to plant where they are designed to be continued; for the younger these trees are planted out, the larger they will grow. But there are many who will object to their being planted out young in parks, because they will require a fence to secure them against cattle; which will also be necessary whatever size they are when planted; and if large, they must be well staked to prevent their being displaced by strong winds: and when we consider how much faster a young tree will grow than one which is removed at a greater age, there can be no excuse for planting large trees.

The Horse-chesnut requires little care in the management, is never injured by cold in our climate, and will thrive in most soils and situations: but in a sandy loam it makes the greatest progress; and if the soil be inclining to moisture, the leaves will continue in verdure much longer than in very dry ground.

When these trees are transplanted, their roots should be preserved as entire as possible, for they do not succeed well when torn or cut; nor should any of the branches be shortened, for there is

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* Collect. 3. 85. † Mill. ‡ Hort. Kew. § Boutcher.

scarcely any tree which will not bear amputation better than this; so that when any branches are by accident broken, they should be cut off close to the stem, that the wound may heal over.

There is something very singular in the growth of this tree, which is that the whole shoot is completed in less than three weeks, after the buds are opened, in which time I have measured shoots a foot and a half long, with their leaves fully expanded: and no sooner are the flowers fallen, than the buds for the succeeding year are formed, which continue swelling till autumn, at which time the folding covers are spread over with a thick tenacious juice, serving to defend the tender buds from the frost and rain in winter; but upon the first return of warmth in the spring, this melts and runs off, leaving the bud at liberty to extend. This juice is never so far hardened as to injure the tender buds, which are always formed at the extremity of the former year's shoot; a plain direction not to shorten them, for by so doing, the future shoots are entirely cut off.

There are varieties of this tree in the nurseries, both with gold and silver striped leaves. These are increased by layers, and by budding or ingrafting them upon the stocks of the common sort.

The Scarlet Horse-chesnut may also be propagated by the nuts, which must be procured from the countries where the trees naturally grow. They should be sown in pots early in the spring; and the pots must be plunged into a moderate hot-bed to forward their growth; toward the end of May, the pots should be plunged into the ground in a south-east border, and in dry weather the plants should be duly watered, that they may acquire strength by the autumn; when it will be very proper to screen the plants from early frosts which often pinch the top buds, and occasion their decay in the winter; for while the plants are young they are impatient of frosts, but when they have obtained strength, it seldom hurts them: the spring following, the plants should be carefully separated and planted at the distance of a foot from each other, in a sheltered situation; and the following winter, when it proves cold, it will be proper to cover the plants with some light covering. After the second winter they will require no farther sheltering.

Others think it sufficient to sow the nuts on a warm border, in a rich, loose, sweet mould; to remove them the succeeding spring to a situation and soil of the same quality, where they may remain three years, when they will have acquired strength enough for any situation not too much exposed.

The common method practised by the nursery-men, who propagate this tree for sale, is to graft or bud it upon stocks of the common Horse-chesnut; but as the stock greatly outgrows the bud or graft, the trees make a bad appearance, nor do they last long.

Genus 3. AMYGDALUS. *Almond. Peach.* Class XII. Icosandria. Order I. Monogynia.

Species 1. *Almond Tree.* (AMYGDALUS COMMUNIS.)

The Common Almond will grow to the height of near twenty feet, with spreading branches. The leaves resemble those of the Peach very much, but the lower serratures are glandular; they proceed from the buds both above and below the flowers, whereas in the Peach they proceed from the ends of the shoots above and not below the flowers. The form of the flowers is not very different, but they come out usually in pairs, and vary more in their colour from the fine blush of the Apple-blossom to a snowy whiteness. The chief obvious distinction is in the fruit, which is flatter, with a coriaceous covering, instead of the rich pulp of the Peach and Nectarine, opening spontaneously when the kernel is ripe. The shell is never so hard as in the first species, and is sometimes

even tender and exceedingly brittle; it is flatter, smoother, and the furrows or holes are more superficial.

This tree is scarcely worth considering in England, for the sake of the fruit which it produces. It is a great object in some parts of Italy, and in the south of France, where there are vast plantations of Almonds in Provence and Dauphiné. It is common in China and most of the Eastern countries; and in Barbary, where it is a native. It seems not to have been cultivated in Italy in the time of Cato, who calls the fruit *Nuces Græcæ*, or Greek nuts. With us however it is very valuable as an ornamental tree in clumps, shrubberies, &c. within view of the mansion: for it displays its delicate red-purple bloom in the month of March, when few other trees have either leaves or flowers. An Almond-tree covered with its beautiful blossoms is one of the most elegant objects in nature.

In a forward spring they often appear in February, but in this case, frost generally destroys them, and they bear little or no fruit; whereas when the trees do not flower till March, they seldom fail to bear plenty of fruit, many of which will be very sweet and fit for the table when green, but they will not keep long.

Mr. Miller makes three species of the Almond: 1. *Amygdalus communis*, or *common Almond*, which is cultivated more for the beauty of its flowers, than for its fruit. There are two varieties of this, one with sweet, the other with bitter kernels, which often arise from the fruit of the same tree.

2. *A. dulcis*, or *Jordan Almond*, the nuts of which are frequently brought to England; they have a tender shell, and a large sweet kernel. The leaves are broader, shorter, and grow much closer than those of the common sort, and their edges are crenate. The flowers are very small and of a pale colour, inclining to white. I have several times raised these trees from the Almonds which came from abroad, and always found the plants to maintain their difference from the Common Almond.

3. *A. sativa*: which has narrow sharp-pointed leaves; the flowers are much smaller than those of the Common Almond, and are white: the shoots of this tree are smaller, and the joints closer than those of the common sort, nor is the tree so hardy, therefore it should have the advantage of a warm situation, otherwise it will not thrive. This sort flowers early in the spring, and rarely produces fruit in England. But from an old tree which grew against a wall having a south aspect, I have some years had the fruits ripe, which were well flavoured, but their kernels were small.

Species 2. *Silvery-leaved Almond.* (Amygdalus Orientalis.)

The leaves of the *Eastern* or *Silver-leaved Almond* are silvery, and very like those of the Sea Purslane. These continue most of the year. The flowers are very small, and have not been succeeded by fruit yet in England. It was found growing near Aleppo, from whence the fruit was sent to the Duke D'Ayen in France, who raised several of the plants in his curious garden at St. Germain's, and was so good as to send me, says Mr. Miller, a share of them in 1759, which endured the open air in the Chelsea garden, for some years against a wall, without any covering. It is a native of the Levant.

Species 3. *Peach.* (Amygdalus Persica.)

The *Peach*, in its natural state of growth, is a small tree, with spreading branches. The leaves larger than those of the Almond, lanceolate, alternate, smooth and serrate; the serratures short, sharp and regular. The flowers are sessile, and solitary; the calyxes reddish, the corollas bell-shaped, with a spreading border, of a fine light purple, or pale rose-colour, but with very little scent. The

fruit is a roundish drupe, commonly pointed opposite to the peduncle, and with one longitudinal groove: the pulp is large, fleshy, and succulent, white or yellowish, sometimes reddish, abounding with a grateful sweet-acid juice; the outside is of a pale greenish colour, with a blush or tawny redness frequently towards the sun, and the skin is lanuginous or woolly: the stone is very thick and hard, full of deep irregular furrows, and incloses a bitter kernel. The wood of this tree is of a reddish brown colour, darker towards the middle, and is fit for the use of the turner. It is of quick growth, and not of very long duration.

The original country of its nativity is not known. The Latin name of *Malus Persica* indicates no more than that it came to the Romans from Persia. It has been cultivated time immemorial in most parts of Asia, has been adopted by almost every nation of Europe, and now flourishes abundantly in America, wherever it has been introduced by the Europeans. We have no exact tradition concerning the time of its first introduction into Greece or Italy; but no mention of it is made by Theophrastus, for what he says of the *Persea* by no means agrees with this tree.

Than the Peach-tree it may be proper to observe, that there are few trees more ornamental in plantations, shrubberies, and wilderness quarters, particularly within view of the house, and in sheltered situations, where they will display their beautiful blossoms early in the spring, about the beginning of April; when flowers, especially on trees, are particularly valuable.

The variety with double flowers is highly ornamental for the same purpose, and is certainly one of the most beautiful flowering trees that will admit of cultivation in our climate, in the open air. It will produce some fruit, notwithstanding the flowers are double, but it is no value, unless the trees be trained against walls. The blossoms appear about three weeks later than the common Peach.

We are enabled to ascertain nearly the introduction of the double-blossomed Peach among us, from Parkinson. For in his *Paradisus terrestris*, published in 1629, he says, "it hath not been seen or knowne, long before the writing hereof."

This author mentions twenty-one sorts of Peaches cultivated in his time for the fruit, the names of which are—1. The great white. 2. The small white. 3. Carnation. 4. Grand Carnation. 5. Red. 6. Russet. 7. Island. 8. Newington. 9. Yellow. 10. St. James's. 11. Melocotone. 12. Peach du Troas. 13. Queen's. 14. Roman. 15. Durasme or Spanish. 16. Black. 17. Alberza. 18. Almond Peach. 19. Man Peach. 20. Cherry Peach. 21. Nutmeg Peach.

Mr. Ray, sixty years after Parkinson, gives a list of eighteen different sorts of Peaches then in most esteem, the names of which are as follows:—1. The White Nutmeg. 2. The Red Nutmeg. 3. The Troy Peach, so called from Troyes in Champagne. 4. The Isabella. 5. The Savoy. 6. The Bourdeaux. 7. The early Newington. 8. The old Newington. 9. Violet Muscate. 10. Persicum. 11. Modanese. 12. Morello. 13. Rumbulliam. 14. Bellice. 85. Scarlet. 16. Royal. 17. Ricket. 18. Bloody Monsieur.

Mr. Miller enumerates thirty-one sorts as the principal known in his time in England; and which in his opinion are sufficient for any gentleman to have a collection continuing through the whole season of fruit.

1. The *white Nutmeg* (called by the French, L'Avant Pêche Blanche; Duh. n. 1. t. 2.) the fruit is small and white; it is a little musky and sugary, but it is only esteemed for its being the first sort ripe. It is in eating pretty early in July, and soon becomes mealy.

2. The *red Nutmeg* (L'Avant Pêche de Troyes; Duh. n. 2. t. 3.) the fruit is larger and rounder than the white Nutmeg, and is of bright vermilion colour; the flesh is white, but very red at the stone; it has a rich musky flavour, and parts from the stone. This Peach is well esteemed, and ripens towards the end of July.

3. The *early* or *small Mignon* (Double de Troyes, or Mignonette: Duh. n. 3. t. 4.) the fruit is of a middling size, and round; it is very red on the side next the sun; the flesh is white, and separates from the stone, where it is red; the juice is vinous and rich. It is ripe the end of July, or beginning of August.

4. The *yellow Alberge:* (Duh. n. 5. t. 5.) the fruit is of a middling size, somewhat long; the flesh is yellow and dry; it is seldom well flavoured, but should be perfectly ripe before it is gathered, otherwise it is good for little. It is ripe early in August.

5. The *white Magdalen:* (Duh. n. 8. t. 6.) the fruit is round, of a middling size; the flesh is white to the stone, from which it separates; the juice is seldom high flavoured; the stone is very small. This ripens early in August.

6. The *early purple*, (La Pourprée hâtive: (Duh. n. 12. t. 8.) the fruit is large, round, and of a fine red colour; the flesh is white, but very red at the stone; is very full of juice, which has a rich vinous flavour, and is by all good judges esteemed an excellent Peach. This is ripe before the middle of August.

7. The *large* or *French Mignon:* (Grosse Mignonne: Duh. n. 14. t. 10.) the fruit is a little oblong, and generally swelling on one side; it is of a fine colour; the juice is very sugary, and of a high flavour; the flesh is white, but very red at the stone, which is small. This is ripe in the middle of August, and is justly esteemed one of the best Peaches, as it separates from the stone. This sort of Peach is tender, and will not thrive on a common stock, so is generally budded upon some vigorous shooting peach, or an Apricot, by the nurserymen, which enhances the price of the trees. But the best method is to bud this Peach into some old healthy Apricot, which is planted to a south or south-east aspect, and to cut away the Apricot when the buds have taken, and made shoots: upon some trees which I have seen thus managed, there has been a much greater quantity of fairer, and better flavoured fruit than I have ever observed elsewhere, and the trees have been much more healthy.

8. The *Chevreuse:* (Belle Chevreuse: Duh. n. 18.) the fruit is of a middling size, a little oblong, of a fine red colour; the flesh is white, but very red at the stone, from which it separates; it is very full of a rich sugary juice, and ripens towards the end of August. This is a very good bearer, and may be ranged with the good Peaches.

9. The *red Magdalen:* (Madeleine de Courson: Duh. n. 10. t. 7.) the fruit is large and round, of a fine red colour; the flesh is white, but very red at the stone, from which it separates; the juice is very sugary, and of an exquisite flavour. The fruit is ripe the end of August.

10. The *early Newington*, or *Smith's Newington:* (very like, if not the same, with what the French call Le Pavie blanc. Duh. n. 9.) the fruit is of a middling size, is of a fine red on the side next the sun; the flesh is firm and white, but very red at the stone, to which it closely adheres. It has a sugary juice, and is ripe the end of August.

11. The *Montauban:* the fruit is of a middling size, of a deep red, inclining to purple next the sun, but of a pale colour toward the wall; the flesh is melting and white to the stone, from which it separates: the juice is rich, and the tree is a good bearer. It ripens the middle of August.

12. The *Malta:* (which is very like, if not the same, with the Italian Peach: Duh. n. 11.) the fruit is of a middling size, of a fine red next the sun; the flesh is white and melting, but red at the stone, from which it separates; the stone is flat and pointed: the tree is a good bearer. This ripens the end of August.

13. The *Noblesse:* the fruit is large, of a bright red next the sun; the flesh is white and melting, and separates from the stone, where it is of a faint red colour; the juice is very rich in a good season. It ripens the end of August, or beginning of September.

14. The *Chancellor:* (Duh. n. 19.) the fruit is shaped somewhat like the Belle Chevreuse, but is rounder; the flesh is white and melting, and separates from the stone, where it is of a fine red colour; the skin is thin, and the juice is very rich. It ripens about the end of August. This tree is very tender, and will not succeed on common stocks, so is budded twice, as the Mignon; and if budded on Apricots, will thrive much better than in any other method.

15. The *Bellegarde* (Gallande; Duh. n. 28. t. 20.) the fruit is very large and round, of a deep purple colour on the side to the sun; the flesh is white, melting, and separates from the stone, where it is of a deep red colour; the juice is very rich. This ripens the beginning of September.

16. The *Lisle* (La petite Violette hâtive: Duh. n. 22. t. 16. f. 2.) the fruit is of a middling size, of a fine violet colour toward the sun; the flesh is of a pale yellow and melting; it adheres to the stone, where it is very red; the juice is very vinous. This ripens the beginning of September.

17. The *Bourdine:* (Duh. n. 16. t. 12.) the fruit is large, round, and of a fine red colour next the sun; the flesh is white, melting, and separates from the stone, where it is of a fine red colour; the juice is vinous and rich; this ripens the beginning of September. The tree bears plentifully, and will produce fruit in standards very well.

18. The *Rosanna:* (Duh. n. 6.) the fruit is large, a little longer than the Alberge; the flesh is yellow and separates from the stone, where it is red; the juice is rich and vinous. This ripens the beginning of September. This is the same with what some call the purple, and others the red Alberge, it being of a fine purple colour on the side next the sun.

19. The *Admirable:* (Duham. n. 29. t. 21.) the fruit is large, round, and red on the side next the sun; the flesh is white, melting, and separates from the stone, where it is of a deep red colour; the juice is sugary and rich: it ripens the beginning of September. This is by some called the early Admirable, but is certainly what the French call L'Admirable, and they have no other of this name which ripens later.

20. The *old Newington:* the fruit is fair and large, of a beautiful red colour next the sun: the flesh is white, melting, and closely adheres to the stone, where it is of a deep red colour; the juice is very rich and vinous. It ripens about the middle of September.

21. The *Rambouillet* (commonly called the Rumbullion:) the fruit is of a middling size, rather round than long, deeply divided by a furrow in the middle; it is of a fine red colour next the sun, but of a light yellow next the wall; the flesh is melting, of a bright yellow colour, and separates from the stone, where it is of a deep red colour; the juice is rich, and of a vinous flavour. This ripens the middle of September, and is a good bearer.

22. The *Bellis* (which I believe to be what the French call La Belle de Vitry: Duham. n. 34. t. 25.) the fruit is of a middle size, round, and of a pale red next the sun; the flesh is white and adheres to the stone, where it is red, the juice is vinous and rich. This ripens the middle of September.

23. The *Portugal:* the fruit is large, and of a beautiful red colour towards the sun, the skin generally spotted; the flesh is firm, white, and closely adheres to the stone, where it is of a faint red colour; the stone is small, but full of deep furrows; the juice is rich and vinous. This ripens the middle of September.

24. *La Teton de Venus:* (Duham. n. 32. t. 23.) the fruit is of a middling size resembling the Admirable, of a pale red colour next the sun; the flesh is melting, white, and separates from the stone, where it is red; the juice is sugary and rich. This ripens late in September.

25. *La Pourprée* (Pourprée tardive, Duham. n. 13. t. 9.) the fruit is large, round, and of a fine purple colour; the flesh is white, melting, and separates from the stone, where it is red; the juice is sugary and rich. This ripens late in September.

26. The *Nivette:* (Duham. n. 37. t. 28.) the fruit is large, oblong, of a bright red colour next the sun, and of a pale yellow on the other side; the flesh is melting, and full of rich juice, and is very red at the stone, from which it separates: it ripens in the middle of September.

27. The *Royal* or *Royal George* (La Royale: Duham. n. 33. t. 24.) the fruit is large, rouud, and of a deep red on the side next the sun, and of a paler colour on the other side; the flesh is white, melting, and full of a rich juice; it parts from the stone, where it is of a deep red colour. This ripens the middle of September, and, when the autumn is good, is an excellent Peach.

28. The *Persique:* (Duham. n. 38. t. 29.) the fruit is large, oblong, and of a fine red colour next the sun; the flesh is melting, and full of a rich juice; it separates from the stone, where it is of a deep red colour. The stalk has a small knot upon it; this makes a fine tree, and is a good bearer; it ripens the end of September. Many gardeners call this the Nivette.

29. The *monstrous Pavy of Pomponne* (La Pavie rouge de Pomponne: Duham. n. 35. t. 26.) the fruit is very large and round, many times fourteen inches in circumference; the flesh is white, melting, and closely adheres to the stone, where it is of a deep red colour; the outside is a beautiful red next the sun, and of a pale flesh colour on the other side. This ripens the end of October, and when the autumn is warm, is an excellent Peach.

30. The *Catharine:* the fruit is large, round, and of a dark red colour next the sun, the flesh is white, melting, and full of a rich juice. It closely adheres to the stone, where it is of a deep red colour; it ripens the beginning of October, and in very good seasons is an excellent Peach, but being so very late ripe, there are not many situations where it ripens well.

31. The *Bloody Peach* (La Sanguinole: Duham. n. 41.) this Peach is of a middling size, of a deep red next the sun; the flesh is of a deep red quite to the stone, and from thence is by some gardeners called the Mulberry Peach. This fruit rarely ripens in England, therefore is not often planted, but it bakes and preserves excellently; for which, as also the curiosity, one or two trees may be planted, where there is extent of walling.

The *Nectarine* is deemed by botanists to be a variety only of the Peach-tree. It is certainly not easy for a common eye to distinguish these trees, when they are not in a state of fructification, nor are their differences such as to warrant our considering them as specifically separate.

The Nectarine is commonly a smaller tree than the Peach; the trunk and larger branches covered with a lighter bark; the smaller branches or twigs more tender and inclining to red; the flowers are less than those of the Peach, and of a darker red colour. These differences however are frequently trifling, and by no means constant. The principal distinction is certainly in the fruit, which is smaller and rounder, without any lateral cleft; the flesh or pulp firmer than in the Peach, and the skin or rind perfectly smooth.

This tree has its name *Nucipersica*, from the similitude of the fruit in smoothness, colour, size, and form to the Walnut (Nux), covered with its outer green shell. The English name of *Nectarine* is deservedly given it, from the rich, racy, nectareous flavour of the fruit; which in its highest perfection is superior to any other European fruit, and perhaps to many boasted fruits of hotter climates.

Parkinson gives six varieties of the Nectarine: or, according to his orthography, the Nectorin. 1. The Muske. 2. The Roman Red. 3. The bastard Red. 4. The Yellow. 5. The Green. 6. The White.

To these Ray adds—7. The Murrey. 8. The Tawney. 9. The Yellow; which he probably supposed to be different from Parkinson's fourth; otherwise it is a repetition. 10. The Russet. 11. The Painted or Variegated. 12. The Algiers.

Mr. Miller has only ten varieties, as follows.

1. *Fairchild's early Nectarine.* This is one of the earliest Nectarines we have; it is a small round fruit, about the size of the Nutmeg Peach, of a beautiful red colour, and well flavoured; it ripens the end of July, or beginning of August.

2. *Elruge Nectarine:* it is a middle-sized fruit, of a dark-red or purple colour next the sun, but of a pale yellow or greenish colour towards the wall; it parts from the stone, and has a soft melting juice: this ripens the beginning or middle of August.

3. *Newington Nectarine:* it is a fair large fruit, (when planted on a good soil) of a beautiful red colour next the sun, but of a bright yellow towards the wall; it has an excellent rich juice; the pulp adheres closely to the stone, where it is of a deep red colour: this ripens the latter end of August, or beginning of September, and is the best flavoured of all the sorts, or perhaps of any known fruit in the world.

4. *Scarlet Nectarine* is somewhat less than the last, of a fine red or scarlet colour next the sun, but loses itself in paler red towards the wall: this ripens the end of August, or beginning of September.

5. *Brugnon* or *Italian Nectarine*, is a fair large fruit, of a deep red colour next the sun, but of a soft yellow towards the wall; the pulp is firm, of a rich flavour, and closely adheres to the stone, where it is very red: this ripens the end of August, or beginning of September.

6. *Roman Red Nectarine*, is a large fair fruit, of a deep red or purple colour towards the sun, but has a yellowish cast next the wall: the flesh is firm, of an excellent flavour, closely adhering to the stone, where it is very red: this ripens in September.

7. *Murry Nectarine* is a middle sized fruit, of a dirty red colour on the side next the sun, but of yellowish green towards the wall, the pulp is tolerably well flavoured: this ripens the beginning of September.

8. *Golden Nectarine* is a fair handsome fruit, of a soft red colour next the sun, but of a bright yellow next the wall; the pulp is very yellow, of a rich flavour, and closely adheres to the stone, where it is of a faint red colour: this ripens the middle of September.

9. *Temple's Nectarine* is a middle-sized fruit, of a soft red colour next the sun, of a yellowish green toward the wall: the pulp is melting, of a white colour towards the stone, from which it parts, and has a fine poignant flavour: this ripens the end of September.

10. *Peterborough*, or *late green Nectarine*, is a middle sized fruit, of a pale green colour on the outside next the sun, but of a whitish green towards the wall; the flesh is firm; and, in a good season, tolerably well flavoured; this ripens the middle of October.

The best of these are the first, second, third, sixth and ninth; particularly the Newington and Roman. Some of the old Nectarines, not mentioned by Mr. Miller, are still in cultivation; as the White (n. 6.) which is ripe in August and September; the Tawney (n. 8) which ripens in September, is a middle-sized fruit, and adheres to the stone; (see p. 451.) and some others.

There are some persons who pretend to have more varieties than are here enumerated, but I much doubt whether they are different, there being so near a resemblance between the fruits of this kind, that it requires a very close attention to distinguish them well, especially if the trees grow in different soils and aspects, which many times alter the same fruit so much, as hardly to be distinguished by persons who are very conversant with them.

That the *Peach* and *Nectarine* are but varieties of the same plant, I have seen a Peach-tree occasionally produce a Nectarine, and in a very few instances a monstrous production, half a Peach, and half a Nectarine.

CULTURE.

The *Almond* is raised by seed, in order to which having procured some well ripened Almonds,

they must be sown either in October or November, or these must be preserved in sand until February or March. The soil should be light, and the stones should be sown two inches deep.

All the different kinds of *Peaches* have been originally obtained from the stones; so that where persons have garden enough to allow room for propagating these fruits from seeds, there is no doubt but many good sorts may be obtained, which will be better adapted to our climate, than such as are brought from warmer countries; there will be many of them good for nothing, but if we can obtain only two or three valuable sorts, it is sufficient to make amends for the trouble of raising them; but great regard should be had to the sorts; and if the fruits were permitted to remain upon the trees until they dropped off, the kernels would be fitter for planting, and more likely to grow. The best sorts for sowing are those whose flesh is firm, and cleaves to the stone; and from amongst these you should choose such as ripen pretty early, and have a rich vinous juice.

These stones should be planted in autumn, on a bed of light dry earth, about three inches deep, and four inches asunder; and in the winter the beds should be covered to protect them from the frost, which, if permitted to enter deep into the ground, will destroy them. In the spring, when the plants come up, they should be carefully cleared from the weeds, which should also be preserved throughout the summer: and if the spring should prove very dry, if you refresh them now and then with a little water, it will greatly promote their growth. In this bed they should remain till the following spring, when they should be carefully taken up, so as not to break their tender roots, and transplanted into a nursery in rows three feet asunder, and one foot distant plant from plant in the rows, observing to lay a little mulch upon the surface of the ground about their roots, to prevent its drying too fast; and if the spring should prove very dry, you should give them a little water once a week, until they have taken root; after which they should be constantly kept clear from weeds, and the ground between the rows carefully dug up every spring to loosen it, so as that the tender fibres may strike out on every side.

In this nursery they may continue one or two years, according to the progress they make; after which they should be transplanted where they are to remain, to produce fruit.

In removing these trees, you should observe to prune their downright roots, if they have any, pretty short, and to cut off all bruised parts of the roots, as also all the small fibres, which generally dry, and when left upon the roots after planting again, grow mouldy and decay, so that they are injurious to the new fibres which are shot out from the roots, and very often prevent the growth of the trees; but you should by no means prune their heads, for the plants which are produced from stones, are generally of a more spongy texture; and so more liable to decay when cut, than those which are budded upon other stocks. Besides, as these trees are designed for standards (for it is not proper to plant them against walls, until you see the produce of the fruit, to shew which of them deserves to be cultivated,) they will never require any other pruning, but only to cut out decayed branches, or such as shoot out very irregular from the sides, for more than this is generally very injurious to them.

In planting these trees, it will be the better way to dispose them singly in the quarters of the kitchen garden, where they will thrive, and produce fruit, much better than if they were planted near each other in rows; and as they are thus singly disposed, they will not do much injury to the crops which grow under them.

When they have produced fruit, you will soon be a judge of their goodness, and such of them as you dislike may be destroyed; but those which are good, may be propagated by inoculating them upon other stocks, which is the common method now practised to propagate these fruits.

Genus 4. ANNONAS. *Custard Apple.* Class XIII. Polyandria. Order VII. Polygynia.

This genus can scarcely be called hardy, the trifid-fruited (Triloba) and smooth (Glabra) however will live in a warm situation.

Species 1. *Trifid-fruited Custard Apple.* (ANNONAS TRILOBA.)

The trunk of the *trifid-fruited* is seldom bigger than the small of a man's leg, and rises about ten or twelve feet high, having a smooth, greenish-brown bark. In March, when the leaves begin to sprout, its blossoms begin to appear, consisting each of six greenish-white petals. The fruit grows in clusters of three, and sometimes four together; they are at first green, and when ripe yellow, covered with a thin smooth skin, which contains a yellow pulp, of a sweet luscious taste; in the middle of which lie in two rows, twelve seeds, divided by so many thin membranes. All parts of the tree have a rank, if not a fetid smell; and the fruit is relished by few, except negroes. These trees grow usually in low shady swamps, and in a very fat soil.*

Mr. Miller observes, that this is rather a shrub than a tree, and that the flowers, at least in England, are of a rusty purple colour. He mentions, that the largest plant he had seen, was in the Duke of Argyle's garden at Whitton, near Hounslow, which produced flowers the beginning of May. It is a native of the Bahama islands, Carolina, Maryland, and Virginia; and the seeds are frequently brought to England, by the title of *Papaw-tree.*† It was introduced here in 1736, by Peter Collinson, Esq.‡

Species 2. *Smooth Custard Apple.* (ANNONAS GLABRA.)

The *smooth* is a shrub, or small tree, and grows to the height of about sixteen feet, covered with a smooth, greenish bark. Leaves thick, stiff, and shaped like those of the Lemon. The fruit is covered with a smooth, yellowish-green skin; the pulp is of the consistence of a ripe pear, and contains more conic, brown seeds. This is an eatable fruit, very sweet, but somewhat insipid: it is the food of the Guanas, and many other wild creatures.§ It is a native of North America.

CULTURE.

These two sorts will thrive in the open air in England, if they be planted in a warm situation; but the plants should be trained up in pots, and sheltered in winter for two or three years, until they have acquired some strength; then they may be turned out of the pots in the spring, and planted in the full ground, where they are to remain.

The seeds of Species 2, are frequently brought to England from North America, and many plants have been raised from them in the gardens near London. When the seeds are sown, they frequently remain a whole year in the ground; therefore the earth in the pots should not be disturbed, where they are sown, if the plants do not come up the first year; and the pots should be sheltered in winter, and the following spring if they are plunged into a new hot-bed, the plants will come up much sooner than those which are sown in the open air, and will have more time to get strength before the winter.

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* Catesby. † Miller's Figures. ‡ Hort. Kew. § Catesby.

Genus 5. Aralia. Class V. Pentandria. Order V. Pentagynia.

Species 1. *Thorny Aralia*, or *Angelica Tree.* (Aralia Spinosa.)

This rises with a woody stem to the height of eight or ten feet, dividing into several branches, with branching leaves, composed of many divaricated wings, with oblong leaflets; the ribs of the leaves, as also the branches and stem, are armed with strong crooked spines, rendering the places where the plants grow in plenty very difficult to pass through. The flowers are produced in large loose umbels, at the extremities of the branches, and being of an herbaceous colour make no great figure. It is native of Virginia, whence it was sent to England by Banister, and was cultivated in 1688, by Bishop Compton, at Fulham. Mr. Ray also mentions, that there was then a tree of this species in the botanic garden at Chelsea, which was above the human stature, and thicker than a man's arm. It had not then flowered here.*

Species 2. *Berry-bearing Aralia.* (Aralia Racemosa.)

This reaches only three or four feet high, and therefore can scarcely come in as a tree. It produces round berries, which when ripe are black. It flowers in July, and the seeds ripen in October. Native of Canada; where the berries are eaten, and both leaves and roots are used as salads and potherbs by the Indians and French.†

Species 3. *Naked-stalked Aralia.* (Aralia Nudicaulis.)

It rises nearly to the same height as the former. The flower-stalks spring immediately from the root, and are terminated by round umbels of flowers, in shape and colour like the foregoing; but the berries are smaller. This flowers towards the end of July, and the seeds ripen late in the autumn. The roots were formerly brought over and sold for Sarsaparilla, and some of the inhabitants of Canada make use of it as such, but it is very different from the true sort. Native of Virginia and Canada. Linnæus says, there is one very like it, and perhaps the same, in Java.

This and the foregoing were cultivated by Mr. Miller, in 1731.‡

CULTURE.

Species 1. This is propagated by seeds, which are easily procured from North America; but as they seldom arrive here till toward the spring, the plants never come up the first year: therefore when the seeds arrive, they should be sown in pots, filled with light earth, and placed in a shady situation, where they may remain until the next autumn, being careful to weed the pots constantly: otherwise if weeds are permitted to grow till they are large, they cannot be taken out, without drawing up the seeds with their roots. In the autumn, the pots should either be plunged into an old bed of tan, or planted in a warm border under the shelter of a hedge or wall; and if the winter proves severe, it will be proper to cover the pots with straw or peas-haulm, to prevent the frost from penetrating deep into the ground. In March the pots should be plunged into a moderate hot-bed, which will bring up the plants early, so that they will have more time to get strength before the following winter. When the plants come up, they should be frequently refreshed with water, and

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* Ray's Hist. † Parkinson. ‡ Hort. Kew.

constantly kept clean from weeds: in May they should be inured to the open air, and when they are removed out of the bed, they should have a shady situation. These plants should not be disturbed the first season, but as they are often injured by frost when young, in October the pots should be placed under a frame, where they may be screened from hard frosts, but in mild weather they should be constantly opened to enjoy the free air. The leaves of these plants fall away in the autumn, so that some persons have supposed them dead, and have thrown them out of the pots. In the spring, before the plants begin to push, they should be carefully shaken out of the pots, and separated; part of them should be planted singly into small pots, and the other may be planted in a bed of light earth in a warm situation. If those which are planted in the small pots are plunged in a moderate hot-bed, it will greatly forward their growth: but they must be early inured to bear the open air, otherwise they will draw up weak. In the following summer they must have a shady situation, and the next winter should be sheltered again; the spring following they may be shaken out of the pots, and planted where they are designed to remain. Those plants which were planted in the bed, will require protection from the frost the first winter; but if the surface of the ground is covered with old tanners bark, it will prevent the frost from penetrating to their roots; and if in hard frosts, some straw, peas-haulm, or any light covering is laid over the bed, it will secure their stems from being injured. The plants in the bed may remain there two years, by which time they will be strong enough to transplant to the places where they are designed to grow. As these plants do not come out very early in the spring, they often continue growing pretty late in the autumn, which causes the extreme parts of their shoots to be very tender, whereby they often suffer from the early frosts in autumn, which frequently kill the upper parts of the shoots: but as their woody stems are seldom injured, they put out new branches below: and if in very severe winters the stems are destroyed, yet the roots will remain, and put out new ones the following summer.

Species 2, 3. Both these sorts are easily propagated by seeds, which are generally produced in plenty. These should be sown in the autumn soon after they are ripe, for those which are sown in the spring, never grow the same year, so that a whole season is gained by the sowing in autumn. When the plants appear, they must be kept clean from weeds during the summer, and in the autumn following, when their leaves decay, the roots may be taken up, and transplanted where they are to remain. They are very hardy plants, so may be planted in any situation; and as they grow naturally in woods, they may be planted in wilderness quarters, under trees, where, although they have no great beauty, yet they will add to the variety.

Genus 6. Betula. *Birch and Alder.* Class XXI. Monoecia. Order IV. Tetrandria.

Species 1. *White Birch-tree.* (Betula Alba.)

For the country whence it came, the time it was introduced here, and its uses, Vide last Section, p. 386.

Species 2. *Black Virginia Birch-tree.* (Betula Nigra.)

This rises to a grand and magnificent tree, and reaches upwards of sixty feet in height, and is equally hardy with the European white Birch. It has been hitherto propagated chiefly for ornamental plantations; but it is to be hoped that it will be admitted also among our forest trees.* It

* Hunter.

was introduced in 1736, by Peter Collinson, Esq.* There are several varieties of this species, as 1. Broad-leaved Virginian Birch. 2. Poplar-leaved Virginian Birch. 3. Paper Birch. 4. Brown Birch, &c.

Species 3. *Canada Birch.* (Betula Lenta.)

For an account of this tree, vide last Section, p. 389.

Species 4. *Common Alder.* (Betula Alnus.)

The common Alder appears generally as a shrub; it will however grow to a considerable tree, thirty-five or forty feet in height. The bark is blackish, in old trees full of clefts. The wood is red and brittle. The leaves are of a dark green colour, and a roundish figure, resembling those of the Hazel, crenate, smooth, in the common sort viscid to the touch; the nerves on the under side have spongy balls at the angles of their ramifications, as in the leaves of the lime-tree; the petioles are grooved above, and near an inch long; at the base of these are lanceolate, blunt stipules. The male catkins are cylindrical, appear in the autumn, and continue to the spring. The females are of a short conical form, like a small fir cone.†

Many botanists, and among others Linnæus himself, have separated the Alder from the Birch; but Linnæus, in his later works, has joined them in the same genus; convinced, as he says, by the second and third species, that nature has placed no limits between them. Gærtner however keeps them distinct, and says that they differ not only in the fruit, but in the flower.

This is native of Europe from Lapland to Gibraltar, and of Asia from the White Sea to Mount Caucasus, thrives in wet and boggy grounds, and on the banks of rivers; flowering with us in March and April.

There is a *long-leaved* Alder from America, which grows to thirty feet in height, and merits a place in all plantations. The branches are slender, smooth, numerous, and dark brown or purple. The leaves are long and free from the clamminess of the common sort: they sometimes continue on the tree even in December, and it has then the appearance of an evergreen.‡

The wood of the Alder is valuable for piles, pipes, pumps, sluices, and in general for all works intended to be constantly under water. It is said to have been used under the Rialto at Venice; and we are told that the morasses about Ravenna were piled with it, in order to lay the foundations for building upon.§ In Flanders and Holland it is raised in abundance for this purpose. It serves also many domestic and rural uses, as for cart-wheels, spinning-wheels, milk-vessels, bowls, spoons, small trays, trenchers, and other turnery ware, troughs, handles of tools, clogs, pattens, wooden heels. The roots and knots furnish a beautiful veined wood for cabinets. The Scotch highlanders often make chairs of it, which are very handsome, and the colour of mahogany. The wood which has lain in bogs is black like ebony. It is very generally planted for coppice wood, to be cut down every ninth or tenth year for poles. And the branches make good charcoal. The bark is used by dyers, tanners, and leather-dressers; also by fishermen for their nets. Both this and the young shoots dye yellow, and with a little copperas a yellowish grey, very useful in the demi-tints, and shadows of flesh in tapestry. The shoots cut in March will dye a cinnamon colour; and a fine tawny, if they be dried and powdered. The fresh wood yields a dye the colour of rappee snuff.

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* Hort. Kew. † Lightf. and Pollich. ‡ Hunter's Evelyn. § Ibid.

The catkins dye green. The bark is used as a basis for blacks: an ounce of it dried and powdered, boiled in three quarters of a pint of water, with an equal quantity of logwood, with solution of copper tin and bismuth, six grains of each, and two drops of solution of martial vitriol, will dye a strong deep *boue-de-Paris*. The leaves have been sometimes employed in tanning leather. The Laplanders chew the bark, and dye their leathern garments red with their saliva. The whole tree is very astringent. The Alder makes good hedges by the sides of streams and ditches, and in all wet morassy soils; and serves to keep up the banks: but if it be planted in a low meadow, it is said that the ground surrounding it will become boggy; whereas if Ash be planted, the roots of which penetrate a great way, and run near the surface, the ground will become firm and dry. The shade of Alder seems to be no material impediment to the growth of grass. The boughs cut in summer, spread over the land, and left during the winter to rot, are found to answer as a manure, clearing the ground in March of the undecayed parts, and then ploughing it. The fresh gathered leaves are covered with a glutinous liquor, in which fleas are said to entangle themselves, as birds do in bird-lime. Linnæus says, that horses, cows, sheep, and goats eat the Alder, but that swine refuse it. The tongues of horses feeding upon it are turned black, and it is supposed by some persons not to be wholesome for them.*

Species 5. *Hoary Alder.* (Betula Incana.)

Native of the alpine and subalpine parts of Switzerland, Dauphiné, in eastern Siberia, in the islands beyond Kamtschatka, &c. It was introduced here in 1780, by Mr. John Bush.†

Species 5. *Long-leaved Turkey.* (Betula Oblongata.)

The leaves are longer, narrower, and not so glutinous as the common sorts; they are also not so rough, and are of a thinner consistence. It is very common in Austria and Hungary, whence Mr. Miller received the seeds, and cultivated it in 1759.‡

Species 6. *Notched-leaved Alder.* (Betula Serrulata.)

Native of Pennsylvania. Cultivated in 1759, by Peter Collinson, Esq.§

Species 7. *Curled-leaved Alder.* (Betula Crispa.)

Native of Newfoundland and Hudson's Bay. Introduced in 1782, by the Hudson's Bay Company.‖

CULTURE.

Species 1. The best method to cultivate the Birch tree, is to furnish yourself with young plants from the woods where they naturally grow, and are generally found there in great plenty; but in places where there are no young plants to be procured near, they may be raised from seeds, which should be carefully gathered in the autumn, as soon as the scales under which they are lodged begin to open, otherwise they will soon fall out and be lost: the seeds being small, should not be buried deep in the ground; a quarter of an inch is sufficient.

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* Linn. Whithering, Lightf. Dambourney. † Hort. Kew.
‡ Ibid. § Ibid. ‖ Ibid.

Mr. Miller recommends autumn as the best season for sowing them: but Mr. Boutcher directs, that having spread the seeds thin on a loft floor till dry, they should be mixed with loose sand, and kept in an airy place till the beginning of March; when they should be sowed on fresh light land, trenched or dug the preceding autumn, made very loose, raked fine, and divided into beds three feet and a half wide. No earth should be thrown over them, but they should be clapped in with the back of a spade. If the weather be dry and frosty, a little peas-haulm may be thrown over the beds for three or four weeks, till the seeds begin to vegetate. Then, the ground being kept clean, three or four gentle waterings may be given at noon in April, which may be repeated till the middle of June in mild evenings. The following March they may be removed into the nursery, in rows two feet and a half distant, and ten or twelve inches asunder, to stand there two years; or three, if they have made little progress. In which case, after the second year's growth, cut such as are least thriving or crooked, close to the ground, in March.

Mr. Miller recommends the seeds to be sown in the shade, and adds that in such a situation, the plants will thrive better than when they are exposed to the full sun; for in all places where there are any large trees their seeds fall, and the plants come up well without care; so that if the young plants are not destroyed by cattle, there is generally plenty of them in all the woods where there any of these trees. These wild plants should be carefully taken up, so as not to destroy their roots. The ground where they are to be planted, will require no preparation; all that is necessary to be done, is to loosen it with a spade or mattock, in the places where the plants are to stand, making holes to receive their roots, covering them again when the plants are placed, and closing the earth hard to the roots.

The broom-makers are constant customers for Birch, in all places within twenty miles of London, or where it is near water carriage; in other parts the hoop-benders are the purchasers; but the larger trees are often bought by the turners, and the wood is used for making ox-yokes, and other instruments of husbandry.

When coppices of Birch are wanted for the broom-maker, the plants from the nursery or the woods should be set five feet asunder: in eight years they will be ready to cut, when an acre will be worth about ten pounds: after this they may be cut every six years. For hoops, &c they may be cut every twelfth year, and will be worth twelve pounds and upwards. Where the land will admit of the plow, a crop of corn is the best preparation.*

Species 2, 3, &c. The American sorts may be propagated by seeds in the same manner as the first, and are equally hardy. As these grow more vigorously than the common sort, and thrive on the most barren ground, they may be cultivated to great advantage in England.

Species 4. The Alder, delighting in a very moist soil, where few other trees will thrive, is a great improvement to such lands. It is propagated by layers, cuttings, or truncheons about three feet in length. The best time for planting truncheons is in February or the beginning of March; they should be sharpened at one end, and the ground must be loosened with an iron crow before they are thrust into it, that the bark may not be torn off. They must be planted at least two feet deep, to prevent their being blown out of the ground by strong winds, after they have made their shoots. The plantations should be cleared at first of tall weeds; but when the trees have made good heads, they will require no farther care.

If you raise them by layers, this operation must be performed in October, and by the October following they will have taken root sufficiently to be transplanted. They should be set at least a

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* Hunter's Evelyn.

foot and half deep in the ground; and their tops must be cut off to about nine inches above the surface, which will occasion them to shoot out many branches.

In other countries the Alder is always raised from seeds, but I do not know that this method is practised in England.*

These trees will also thrive exceedingly on the sides of brooks; and may be cut for poles every fifth or sixth year. They may also be planted for hedges, in moist ground, where they thrive very fast, and may be trained into very thick close hedges, to the height of twenty feet and upwards. They may also be used in securing the banks of rivers, by planting truncheons very close, or cross-wise. The leaves being large, and of a deep green, have a good effect, and the trees make a much better figure than most other aquatic trees; so that where the beauty of such plantations is considered, these should be preferred to other trees usually planted in swampy grounds.

Species 5. The Hoary Alder, grows naturally in dry sandy soils, and may perhaps be cultivated with the Birch, where land is of little value, as an underwood, and may be propagated either by layers or cuttings; as well as by seeds, where they can be obtained.

Genus 1. Bignonia. *Bignonia.* Class XIV. Didynamia. Order II. Angiospermia.

Species 1. *The Catalpa Tree.* (Bignonia Catalpa.)

The Bignonias are trees or shrubs inhabitants of the hot climates of the East and West Indies, and eminently beautiful.

The *Catalpa* is a deciduous tree, rising with an upright stem, covered with a smooth brown bark, to the height of thirty or forty feet: it sends out many strong lateral branches, having very large, heart-shaped (or ovate) leaves on them, placed opposite at every joint. The flowers are produced in large branching panicles towards the end of the branches; they are of a dirty white colour, with a few purple spots, and faint stripes of yellow on their inside: the tube of the corolla is much shorter, and the upper part more spreading than in the rooting Bignonia; the segments also are deeper cut, and waved on their edges. Two stamens have anthers, and two are without.† The flowers are succeeded by long taper pods; but these have not as yet been produced in England. Mr. Mark Catesby found it growing naturally on the back of South Carolina, at a great distance from the English settlements, and brought it into England about the year 1726. It is now not uncommon in our nurseries and plantations. This tree has a good effect, when it stands in the middle of large openings, where it can freely send forth its side branches, and show itself to advantage. The leaves however come out extremely late in our climate; and it requires a sheltered situation, for where it is much exposed to strong winds, the large leaves are often torn and rendered unsightly, and many times their branches are split and broken by the wind. It flowers in August, and is known in the nurseries by its Indian name *Catalpa*.

The branches dye wool a kind of cinnamon colour.

CULTURE.

The seeds of the Common Catalpa tree are annually brought over from South Carolina. The seedling plants should be placed abroad the beginning of June in a sheltered situation till autumn,

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* Hunter's Evelyn. † Linn.

when they should be placed under a common frame to screen them from frost in winter; but in mild weather they must be fully exposed to the open air. The following spring these may be taken out of the pots, and planted in a nursery-bed, in a warm situation, where they may remain two years, to get strength, and afterwards planted in the places where they are designed to remain. These plants, when young, are frequently injured by frost, for they shoot pretty late in the autumn, so that the early frosts often kill the extremity of their branches; but as the plants advance in strength, they become more hardy, and are seldom injured but in very severe winters. It is late in the spring before these trees come out, which has often caused persons to believe they were dead; and some have been so imprudent, as to cut them down on that supposition, before the tree was well known.

The Catalpa delights in a rich moist soil, where it will make great progress, and in a few years produce flowers.

Genus 8. Carpinus. *Horn-beam,* or *Hard-beam Tree.*

Class XXI. Monoecia. Order VIII. Polyandria.

Species 1. *The Horn-beam,* or *Wych-hasel.* (Carpinus Betulus)

The leaves of this tree begin to open about the end of March, and are usually quite out by the middle of April. The flowers are in full blow towards the end of the same month.

The Horn-beam is very common in many parts of England, but is rarely suffered to grow as a timber-tree, being generally reduced to pollards by the country people; yet where the young trees have been properly treated, they have grown to a large size. I have seen some of them in woods, upon a cold stiff clay, which have been near seventy feet high, with large, noble, fine stems, perfectly straight and sound. Of late years, this has been only considered as a shrub, and never cultivated but for underwood in the country, and in the nurseries to form hedges, after the French taste; for in most of their great gardens, their alcoves, &c. are formed of these trees, as are their trellisses and hedges which surround their plantations. But since these sorts of ornaments have been almost banished from the English gardens, there has been little demand for these trees in the nurseries.

Species 2. *Hop Horn-beam.* (Carpinus Ostrya.)

The Hop Horn-beam sheds its leaves in winter, with the Elm, and other deciduous trees. This tree was first observed in Italy, and is very common in Germany, growing promiscuously with the common sort. It is also said to grow plentifully in many parts of North America, but it is doubtful whether that is not a different sort from this. The Hop Horn-beam is of quicker growth than the common sort, but what the wood of this will be I do not know; for there are but few of the trees in England growing upon their own roots, most of them having been grafted upon the common Horn-beam, which is the usual method of propagating them in the nurseries; but the trees so raised are of short duration, for the graft generally grows much faster than the stock, so that in a few years there is a great disproportion in their size; and where they happen to stand exposed to strong winds, the graft is frequently broken from the stock, after many years growth; for which reason I would caution every person not to purchase any of these trees which have been so propagated.

Species 3. *Flowering Horn-beam.* (Carpinus Virginiana.)

The Virginian flowering Horn-beam will grow to the height of thirty feet, or more, and is of

quicker growth than either of the former sorts: it sheds its leaves in autumn, about the same time with the Elm; and during the time of its verdure, this tree makes a good appearance, being well clothed with leaves, which are of a deep, strong, green colour, resembling more the long-leaved Elm than the Horn-beam.

CULTURE.

Species 1. As the common Horn-beam will thrive upon cold, barren, exposed hills, and in such situations where few other sorts will grow, it may be cultivated to great advantage by the proprietors of such lands. It will resist the violence of winds better than most other trees, and is by no means slow in its growth. But where these are propagated for timber, they should be raised from seeds, upon the same soil, and in the same situation, where they are designed to grow; and not brought from a better land, and a warmer situation, as is too frequently practised. Nor should they be propagated by layers, which is the common method where they are intended for hedges or underwood; for which those so produced will answer the purpose full as well as those raised from seeds, but the latter must always be preferred for timber trees.

The seeds of this tree should be sown in the autumn soon after they are ripe; for if they are kept out of the ground till spring, the plants will not come up till the following year. When the plants appear, they must be kept very clean from weeds, and treated as other forest trees; in two years time they will be fit to transplant, for the sooner all trees which are designed for timber are planted where they are to remain, the larger they will grow, and the wood will be firmer and more durable.

Others prefer keeping the seeds in sand till the spring, and then sowing them in rows two feet and a half asunder, and a foot distance in the rows, or else broadcast and thin on beds of fresh earth, three feet and a half or four feet in breadth, with alleys between of eighteen inches or two feet; covering the seeds three quarters of an inch deep; and in February following loosening the surface so as not to disturb the seeds, and sprinkling on some fresh mould. In these beds they may remain three years; and by that time they will be fit either for hedges or woods. For the former purpose, they may be removed into ten-feet rows, and five feet from each other in the rows, training them annually, and keeping them light and thin at top. After four years they will be seven or eight feet high, and may be planted out to complete hedges where they are designed to remain. The straightest plants may be reserved for trees, and planted from the first nursery, in rows five feet asunder, and two feet distance in the rows. Some prefer the spring for transplanting; and others recommend it to be performed early in October.*

The timber of this tree is very tough and flexible, and might be converted to many useful purposes, if it were suffered to grow to a proper size. But this not having been the case, the principal uses it is applied to is for turnery ware, for which it is an excellent wood, for mill-cogs, heads of beetles, stocks and handles of tools, and yokes. It is also an excellent fuel. Linnæus observes that the wood is very white and tough, harder than Hawthorn, and capable of supporting great weights: and that the inner bark is much used in dying wool yellow.

The leaves remain upon the trees till the young buds in the spring thrust them off, so that they afford much shelter to birds in winter: this also renders them proper to plant round the borders of other plantations in exposed situations to defend and promote the growth of more tender trees.

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* Boutcher and Hunter's Evelyn.

The Horn-beam preserves itself well from the bruttings of deer, so that clumps of this tree are proper in parks, both for beauty and shelter.

There is a variety with striped leaves, which is propagated by budding on the common sort, but the colours are not strong or lively.*

The Horn-beam may be increased in the same manner with the common sort: and they may all be propagated by layers.

Genus 9. CELTIS. *Lote* or *Nettle Tree.* Class XXIII. Polygamia. Order I. Monoecia.

Species 1. *European Nettle Tree.* (CELTIS AUSTRALIS.)

The European Nettle-tree, or Lote-tree with a black fruit, rises with an upright stem to the height of forty or fifty feet, with many slender branches, which have a smooth dark-coloured bark, with some gray spot. Leaves alternate, near four inches long, and about two broad in the middle. Flowers axillary all along the branches; being composed of a green calyx without any corolla they make no appearance; they come out in the spring at the same time with the leaves, and generally decay before these are arrived at half their size. The fruit is, according to Pallas, the size of a small cherry, first yellow, then livid, on a long peduncle.

It grows naturally in the south of Europe, where it is one of the largest trees. D'Asso mentions some of a prodigious height and girt in Spain: and Pallas says, that they attain the size of the Elm in the Chersonesus Taurica. It is not so common in England as the second species, nor do I remember to have seen but two large trees of this sort in the English gardens; one of which was formerly growing in the Bishop of London's garden at Fulham, but was cut down some years past, with many other curious exotic trees, which were there growing in great perfection: the other was in the garden of Dr. Uvedale at Enfield, which had frequently produced fruit, but was never propagated in this country, nor were any young plants in the gardens, till after 1751, when I procured, says Miller, a good quantity of the fruit from Italy, which I communicated to several of my friends.

The wood of this tree is one of the hardest we are acquainted with. Evelyn says that it was anciently used for flutes and other musical instruments, and that hafts for knives and tools were made of the root. When it arrives at any size, its hardness, toughness and flexibility must entitle it to more important services. Its fine regular spreading head, of a cheerful green colour, renders this tree extremely proper for clumps in parks, groves, single trees or avenues.†

Of the branches are made hoops for casks, and fishing-rods. The berries are eaten by birds, and also by children in the south of Europe.‡

Species 2. *American Nettle Tree.* (CELTIS OCCIDENTALIS.)

This tree rises with a straight stem, which in young trees is smooth and of a dark colour; but as they advance it becomes rougher and of a lighter green. The branches spread very much. The leaves are alternate, and on pretty long foot-stalks: they are tender, ovate-lanceolate, a little pubescent; when full grown broad-ovate, acuminate, at the point and base quite entire, in the other parts serrate, naked, nerve-veined, the hinder side only half the size of the other. The flowers come

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* Boutcher. † Ibid. ‡ D'Asso.

opposite to the leaves upon long peduncles. The fruit is smaller than that of the first sort, and when ripe of a dark purple colour.

It is very nearly related to the third species;* but the leaves are much broader and shorter.

It grows naturally in North America, and in a moist rich soil becomes a very large tree. Evelyn says, that John Tradescant, junior, first brought it from Virginia.

It flowers in May, and the seeds ripen in October. There are many large trees of this sort in the English gardens, some of which produce great quantities of fruit annually, which in favourable seasons come to maturity; and there are few years in which the fruit is not sent from America.

This tree comes out late in the spring, but it is the latest in fading of any deciduous tree; nor do the leaves alter their colour long before they fall, but continue in full verdure till within a few days of their dropping off; so that the litter occasioned by the falling leaves may be soon cleared away. There is little beauty in the flower or fruit; but the branches being well clothed with leaves of a fine green colour, the trees, when mixed with others in plantations, make a pleasing variety during the summer season.

The wood of this tree being tough and pliable, is esteemed by coachmakers for the frames of their carriages.

Species 3. *Oriental Nettle Tree.* (Celtis Orientalis.)

This tree rises with a stem about ten or twelve feet high, dividing into many branches, which spread horizontally on every side, and have a smooth greenish bark. The leaves are about an inch and half long, and near an inch broad, inclining to a heart shape, but oblique, one side of the base being smaller and lower than the other; they are of a thicker texture than those of the common sort, and of a paler green, alternate as they are, and on short foot-stalks. Linnæus adds, that they are very finely serrate, and the nerves underneath smooth. The peduncles are axillary, very short and branching. The fruit is oval and yellow, when fully ripe it turns to a darker colour. The wood of this tree is very white.

It is a native of the Levant, and was discovered by Tournefort also in Armenia, whence he sent the fruit to the royal garden at Paris. The trees there raised produced fruit, and from them the other gardens in Europe have been furnished. Mr. Miller cultivated this tree in 1748.† It yields a gum like that of the Cherry:‡ and is now found to be a native of the East Indies, Japan, and the Society Isles.

CULTURE.

These trees are all propagated by seeds, which should be sown soon after they are ripe, when they can be procured at that season, for these frequently come up the following spring, but old seeds not till a twelvemonth after: therefore it is the best way to sow them in pots or tubs, that they may be easily removed, for those which are sown in the spring should be placed in a shady situation in summer, and constantly kept clean from weeds; but in autumn they should be placed in a warm situation, plunging the pots into the ground; and if they are covered over with a little tan from a decayed hot-bed, it will prevent the frost from penetrating the earth to injure the seeds; and if these pots are placed on a gentle hot-bed in the spring, it will greatly forward the vegetation of the seeds, whereby the plants will have more time to get strength before the winter: but when the plants appear above

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* Linn. Spec. † Hort. Kew. ‡ Thunb.

ground they must have a large share of air admitted to them, otherwise they will draw up weak; and as soon as the weather is warm, they must be exposed to the open air, and in summer they must be constantly kept clean from weeds; if the season proves dry, they will require water two or three times a week. In autumn it will be proper to remove the pots, and place them under a hot-bed frame, to shelter them in winter from severe frost; or where there is not that inconveniency, the pots should be plunged into the ground near a wall or hedge; and as the plants, when young, are full of sap, and tender, the early frosts in autumn frequently kill the upper part of the shoots; therefore the plants should be either covered with mats, or a little straw or Pease-haulm laid over them to protect them.

In the following spring the plants should be taken out of the seed-pots, and planted in the full ground: this should be done about the middle or latter end of March, when the danger of the frost is over: therefore a bed or two should be prepared (according to the number of plants raised) in a sheltered situation, and, if possible, in a yielding loamy soil. The ground must be well trenched, and cleared from the roots of bad weeds, and when levelled, should be marked out in lines at one foot distance; then the plants should be carefully turned out of the pots and separated, so as not to tear their roots, and planted in the lines at six inches asunder, pressing the earth down close to the roots. If the ground is very dry when they are planted, and there is no appearance of rain soon, it will be proper to water the beds, to settle the ground to the roots of the plants; and after this, if the surface of the ground is covered with some old tan or rotten dung, it will keep it moist, and prevent the drying winds from penetrating to the roots of the plants.

The following summer, the necessary care must be to keep them constantly clean from weeds; but after the plants are pretty well established in the ground, they will not require any water, especially toward the latter end of summer, for that will occasion their late growth, whereby they will be in great danger of suffering by the autumn frosts; for the more any of these young trees are stopped in their growth by drought towards autumn, the firmer will be their texture, and hence better able to bear the cold.

The plants may remain in these nursery-beds two years, by which time they will have obtained sufficient strength to be transplanted where they are designed to remain for good, because these plants extend their roots wide every way; so that if they stand long in the nursery, their roots will be cut in removing, which will be a great prejudice to their future growth.

These sorts are hardy enough to thrive in the open air in England, as soon as they are become strong; but for the two first winters after they come up from seeds, they require a little protection, especially the third sort, which is tenderer than either of the former. The young plants of this sort frequently have variegated leaves, and those are more impatient of cold than the plain leaved.

Genus 10. Cercis. *Judas Tree.* Class X. Decandria. Order I. Monogynia.

Species 1. *Common Judas Tree.* (Cercis Siliquastrum.)

This tree is called by the Spaniards and Portuguese the Tree of Love: this rises with an upright trunk to the height of twenty feet, covered with a dark brown bark, dividing upwards into many irregular branches, with leaves placed irregularly on the branches, on long foot-stalks; they are of a pale green on their upper, and of a greyish colour on their under side, and fall off in autumn. The flowers come out on every side the branches, and many times from the stem of the tree in large clusters, arising from the same point, on short peduncles; they are of a very bright purple colour, and

make a fine appearance, especially when the branches are covered pretty thick with them: they come out in the spring with the leaves, and are in full beauty before the leaves have attained half their size. The flower is papilionaceous, and having an agreeable poignancy, is frequently eaten in salads. When the flowers fall off, the germ becomes a long flat pod, containing one row of roundish seeds, a little compressed; but these do not often succeed the flowers in this country upon standard trees, for the birds pick off the flowers when fully open; but where they have been planted against good aspected walls, I have seen great plenty of the pods, which, in warm seasons, have ripened very well.

These trees are usually planted with other flowering trees and shrubs for ornaments to pleasure gardens, and for their singular beauty, deserve a place as well as most other sorts, for when they are arrived to a good size, they are productive of flowers, so as that the branches are often closely covered with them; and the singular shape of their leaves makes a pretty variety in the summer, and they are seldom damaged by insects. This tree flowers in May, when planted in the full air, but against warm walls it is a fortnight or three weeks earlier.

The wood of this tree is very beautifully veined with black and green, and taking a fine polish, may be converted to many uses.

There are two varieties of this tree, one with a white, and the other hath a flesh-coloured flower, but these have not half the beauty of the first. Tournefort also mentions one with broader pods and pointed leaves, which I believe is only a variety of this.

Native of the Levant, Spain, South of France, Italy near Rome, and on the Apennines, Japan, &c. Cultivated 1596, by Gerard.*

Species 2. *Canada Judas Tree.* (Cercis Canadensis.)

This tree grows naturally in most parts of North America, where it is called Red Bud, I suppose from the red flower-buds appearing in the spring before the leaves come out; this grows to a middling stature in the places where it is a native, but in England rarely rises with a stem more than twelve feet high, but branches out near the root. The branches of this are weaker than those of the first sort; the leaves are downy, and terminate in points; whereas those of the first are smooth, and round at the end, where they are indented. The flowers of this are also smaller, and do not make so fine appearance as those of the first; but the trees are equally hardy, and will thrive in the open air very well.

The flowers of this sort are frequently put into salads by the inhabitants of America: and the French in Canada pickle the flowers, but these have little flavour. The wood of this tree is of the same colour and texture as that of the first.

The young branches dye wool of a very fine Nankin colour. Cultivated in 1730.†

CULTURE.

These trees may be propagated by sowing their seeds upon a bed of light earth, towards the latter end of March, or the beginning of April (and if you put a little hot dung under the bed, it will greatly facilitate the growth of the seeds); when the seeds are sown, sift the earth over them about half an inch thick; and, if the season prove wet, it will be proper to cover the bed with mats, to preserve it from great rains, which will sometimes burst the seeds, and cause them to rot; the

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* Hort. Kew. † Ibid.

seeds will often remain till the spring following before they come up, so the ground must not be disturbed till you are convinced that the plants are all come up; for some few may rise the first year, and a greater number the second.

When the plants are come up they should be carefully cleared from weeds, and in very dry weather must be now and then refreshed with water, which will greatly promote their growth. The winter following, if the weather is very cold, it will be proper to shelter the plants, by covering them either with mats or dry straw in hard frosts, but they should be constantly opened in mild weather, otherwise they will grow mouldy and decay.

About the beginning of April, you should prepare a spot of good fresh ground, to transplant these out (for the best season to remove them is just before they begin to shoot); then you should carefully take up the plants, being careful not to break their roots, and plant them as soon as possible, because if their roots are dried by the air, it will greatly prejudice them.

When they have remained in the nursery two or three years, they should be transplanted in the spring where they are designed to remain, which may be in the wilderness quarter among other flowering trees, observing to place them with trees of the same growth, so as they may not be overhung, which is a great prejudice to most plants.

Genus 11. Cornus. *Dogwood.* Class IV. Tetrandria. Order I. Monogynia.

Species 1. *Cornelian Cherry.* (Cornus Mascula.)

The other species are shrubs, and this in its wild state is a shrub, four or five feet in height; but cultivated, it advances into a tree, twenty feet high. Shoots ash-coloured and pubescent. Leaves in pairs, ovate-lanceolate, subhirsute. The flowers come out very early in the spring, before the leaves. Leaflets of the involucre lanceolate, often reflected, permanent. Peduncles one-flowered, somewhat villose, from twelve or fifteen to thirty in an umbel. Corolla yellow, spreading, and at length reflected, longer than the stamens. Top of the style bent in and papillose.

The Cornelian Cherry is very common in plantations of shrubs. If the season be mild, the flowers will come out the beginning of February; and though there be no great beauty in them, yet they are produced in plenty at a season when few other flowers appear. Formerly it was cultivated for the fruit, which was used to make tarts, and a rob was kept in the shops.

Cornel, says Evelyn, grows with us of good bulk and stature, and is exceedingly commended for its durableness in wheel-work, pins and wedges, in which it lasts like the hardest iron.

Native of France, Russia, Germany, Switzerland, Austria, Carniola, Piedmont, the Milanese. Cultivated in 1596, by Gerarde.*

CULTURE.

All the sorts of Dogwood may be propagated by their seeds, which, if sown in autumn soon after they are ripe, will most of them come up the following spring; but if the seeds are not sown in autumn, they will lie a year in the ground before the plants will appear, and when the year proves dry, they will sometimes remain two years in the ground; therefore the place should not be disturbed

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* Hort. Kew.

where these seeds are sown, under two years, if the plants should not come up sooner. When the plants are come up, they should be duly watered in dry weather, and kept clean from weeds; and the autumn following they may be removed, and planted in beds in the nursery, where they may remain two years, by which time they will be fit to transplant where they are to remain. The best season for this is in the autumn.

Genus 12. Corylus. *Hazel.* Class XXI. Monoecia. Order VIII. Polyandria.

Species 1. *Common Hazel-nut.* (Corylus Avellana.)

The Hazel-nut or Nut-tree, is properly a shrub. The trunk is covered with a whitish cloven bark, which is smooth on the branches, frequently of a bay colour, and spotted with white; on the shoots it is sometimes smooth, sometimes hairy, ash-coloured and green, with white tubercles. Leaves alternate, gash-serrate, wrinkled, with hairs on both sides standing out, dark green above, bright green beneath, on very hairy round petioles, half an inch in length: the midrib beneath is white and hairy; from that several white nerves proceed vertically; and between these is a veiny net.*

The male catkins appear in autumn, and wait for the expansion of the female gems in the spring. The styles are of a bright red colour, long and setaceous.† The flowering branches, especially those which bear the fertile flowers, are set with short fine hairs terminating in globules. The catkins are in pairs, of a yellowish green colour: the middle segment of the scales pointed at the end. Anthers hairy.‡

White and Red Filberts. The shrubs of these varieties grow more erect than the common Hazel, and the stipules are different in shape. Mr. Miller having found these not to vary, except in the size and colour of the fruit, makes them a distinct species.

The involucre is tubular, fleshy at bottom, turgid, thick, torn at top; the nut ovate-oblong and large. The outer skin of the kernel, dark red.

The Cob-nut has a very large round fruit. The Cluster-nut has the fruit growing in great clusters at the ends of the branches.

The Hazel, says Swinburn, has the name Avellana from Avellino, a city of the kingdom of Naples, about which it is cultivated. It covers the whole face of the neighbouring valley, and in good years brings in a profit of 60,000 ducats (11,250 l.) The nuts are mostly of the large round filbert, which we call Spanish. They were originally imported into Italy from Pontus, and known among the Romans by the appellation of *Nux Pontica*, which in process of time was changed into that of *Nux Avellana*, from the place where they had been propagated with the greatest success.

The Common Hazel-nut is wild in many woods and coppices in England, whence the fruit is gathered in plenty, and sent to the London markets by the country people.

It also serves very well for thickening woods; and when allowed to grow, will make poles of twenty feet, but it is generally cut down sooner for walking sticks, fishing rods, withes for faggotting, &c. for which purposes it is esteemed a profitable wood.

The uses of it recited by Evelyn are—for poles, spars, hoops, forks, angling-rods, faggots, cudgels, coals, and springes to catch birds, withes and bands, the chips to purify wine, hurdles and

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* Pollich. † Lightfoot. ‡ Withering.

wattling. He might have added, crates, springles to fasten down thatch, the roots for inlaying or staining. Where yeast is scarce, they twist the twigs, and steep them in ale during its fermentation, then hang them up to dry, and when they brew put them into the wort.

CULTURE.

This sort may be propagated by its nuts in February; which, in order to preserve them good, should be kept in sand in a moist cellar, where the vermin cannot come at them to destroy them, nor should the external air be excluded from them, which would occasion their growing mouldy.

The Filbert can only be kept true to its kind by suckers or layers; which last make the best trees. In some parts of Kent plantations of Filberts are much attended to. The trees are never suffered to rise above six feet in height, and are regularly pruned like Gooseberry bushes. They are planted at the distance of twelve feet, and when full spread, the cup formed by the branches is six feet diameter. The spaces are cultivated with hoeing crops, the vigour of the trees depending on the stirring of the ground.*

Genus 13. CRATÆGUS. *Beam-tree, Wild Service, Hawthorn.*
Class XII. Icosandria. Order II. Digynia.

Species 1. *White Beam-tree.* (CRATÆGUS ARIA.)

This tree rises to the height of thirty or forty feet, with a large trunk, dividing into many branches; the young shoots have a brown bark, covered with a mealy down; the leaves are between two and three inches long, and one inch and a half broad in the middle, of a light green on their upper side, but white on their under, having many prominent transverse veins, running from the midrib to the border, where they are unequally serrate, some of the teeth being much deeper, and the segments broader than others. The flowers are produced at the ends of the branches in bunches or corymbs, two inches or more in diameter, and very much branched.

It is native of most parts of Europe: chiefly on dry hills and open exposures, in gravel, clay or chalk, and from the fissures of lime-stone rock. With us in the northern, western, and southern parts of the island; in Derbyshire, Norwood near London, and formerly on Hampstead heath, &c. Flowers in May.

Mr. Miller says it is called *White-leaf tree*. According to Mr. Ray, in Worcestershire and Staffordshire, in Lancashire and Westmoreland it has the names of *Red Chess Apples* and *Sea Owlers*. In Derbyshire, they call it the *Wild Pear-tree*. Gerarde calls it *Cumberland Hawthorn*.

The wood, being hard, tough and smooth, is used for axle-trees, wheels, walking-sticks, and the handles of tools. The fruit is eatable when mellowed by the autumnal frosts, and an ardent spirit may be distilled from it.†

The straight handsome growth of the tree, the smoothness of the bark, the extreme whiteness on the under surface of the leaves, the handsome bunches of white flowers on their mealy peduncles, succeeded by red berries, render this a desirable tree to mix with others in ornamental plantations. It bears lopping, and permits grass to grow under it.

The Swedish variety has the leaves deeply sinuated, pinnatifid, and even pinnate. The British tree never is so. Haller remarks that the fruit of this is bitter. It also varies with leaves not tomentose or white underneath; in the variety the peduncles, fruit, &c. are destitute of nap.

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* Hunter's Evelyn. † Withering.

Species 2. *Wild Service. Maple-leaved Service.* (CRATÆGUS TORMINALIS.)

This rises to the height of forty or fifty feet, with a large trunk, spreading at the top into many branches, so as to form a large head. The young branches are covered with a purplish bark, marked with white spots. Leaves alternate, on pretty long foot-stalks, cut into many acute angles, like those of the Maple-tree; they are near four inches long, and three broad in the middle, having several smaller indentures towards the top; they are of a bright green on their upper side, but a little woolly on their under. The flowers are produced in large bunches towards the end of the branches; they are white, and shaped like those of the Pear-tree, but smaller, and on longer peduncles: they appear in May, and are succeeded by roundish compressed fruit, shaped like common Haws, but larger; ripening in autumn, when they are of a brown colour, and if kept till they are soft, in the same way as Medlars, have an agreeable acid flavour.

The wood of this tree is hard and very white; it is useful for many purposes, particularly in mill-work. The fruit is sold in the London markets in autumn.

Native of Denmark, Germany, Austria, Switzerland, Burgundy, Piedmont, England, in many parts, chiefly upon strong soils. In Caen-wood, and Bishop's-wood near Hampstead, in Hertfordshire, &c.

The alpine variety, which Miller makes a distinct species, is about twenty feet high. Leaves oblong-ovate, slightly serrate, on very short foot-stalks, about three inches long, and one inch and a half broad, lessening towards both ends, deep green on both sides. Flowers in small bunches, rarely more than four or five flowers in each. Fruit the size of the common Haw, but dark brown. Native of monte Baldo, and other mountains of Italy.

The other species are shrubs.

CULTURE.

Species 1. The White Beam-tree may be propagated by seeds, which should be sown soon after they are ripe; for if they are kept out of the ground till spring, they remain at least one year in the ground before the plants appear; so that the fruit should be buried in the ground, as is practised with the common Haws, Holly-berries, and those other hard seeds which do not come up the same year; and when the plants come up, they may be treated in the same manner as the Haws, but they should by no means be headed or cut down. On a poor chalky soil they will make great progress, and the wood is very white and hard.

Species 2. The Maple-leaved Service is propagated in the same way, but requires a strong soil.

Genus 14. DIOSPYROS. *Date Plum.* Class XXIII. Polygamia. Order II. Dioecia.

Species 1. *European Date Plum.* (DIOSPYROS LOTUS.)

Loureiro describes it, as a small tree, six feet high, with spreading branches. Leaves ovate-lanceolate, quite entire, large, alternate, smooth, with oblique prominent ribs. Flowers pale, terminating, solitary, with a very large leafy calyx, four or five-parted, flat, permanent. Berry round, half an inch in diameter, yellow, lanuginose, one-celled, containing eight oblong-compressed bony seeds, with very little pulp.

The broad-leaved variety grows up into very large trees in the southern parts of Caucasus. It is also native of the woods of Hyrcania and the whole coast of the Caspian.*

Gesner was informed that it grows on the mountains about Verona; and Ray is pretty confident that he saw it in his way from Lerici to Lucca, not far from the latter. In the woods on the hills about Turin, plentifully about Lyons, and on the eastern coast of Africa, whence it is supposed to have first come to Europe.

Mr. Miller has given the figure of the American sort, which he has confounded with this: he says it is a tree of middling growth in the south of Europe, upwards of thirty feet high; particularly that there is a very old tree in the botanic garden at Padua, which produces plenty of fruit every year, and that many trees have been raised from the seeds of it; but that there are none of these trees in England, except what had been raised by him, from seeds which were sent to him by the Chevalier Rathgeb, his imperial majesty's minister at Venice. He does not seem to have known that Gerarde had planted two trees of this sort in the Earl of Essex's garden at Barne Elmes, that it was also growing in Gerarde's own garden, and in that of Maister Graie, an apothecary of London. Gerarde says, that in English it is called *Bastard Meugnwood*: this name is now quite lost. Parkinson calls it Indian Date Plum.

Species 2. *American Date Plum.* (Diospyros Virginiana.)

The wood of the American Date Plum is very hard, but brittle and somewhat white; the branches are many, and grow slender to the end, covered with a very thin greenish bark. Leaves many, broad, green, without dent or notch on the edges, so like the former, that it seems to be the same.† Our European Lotus, however, has a lighter coloured bark, on the branches inclining to yellow, on the twigs yellow and shining: the American has a dark brown bark on the branches, and on the twigs it is greyish from pubescence, so that they are soft to the touch, whereas the others are smooth. The leaves of the first are in general much narrower, less pointed, more shining on their upper surface, not pubescent on the under, but rather glaucous: those of the second are grey on the back, and pubescent, particularly the midrib and petiole. Fruit in form and bigness like a date, very firm like that fruit, and almost as sweet, with a great flat thick kernel within, very like those of the former, but larger.‡

It rises, in England, to the height of fourteen or sixteen feet, but generally divides into many irregular trunks near the ground, so that it is very rare to see a handsome tree of this sort. It produces plenty of fruit in England, but it never comes to perfection. If it be eaten when it is green, as Captain Smith relates, in the discovery of Virginia, it draws the mouth awry by its harsh and binding taste, but when ripe it is pleasant.§ This is not the case till it has been mellowed by the frost; it is then very sweet and glutinous, with a little astringency; and a considerable quantity may be eaten without inconvenience. In North America they make a palatable liquor with this fruit and malt: they also draw a spirit from it. The time of ripening is from the end of September to December. The wood of this tree is very good for joiner's tools, such as planes, handles to chisels, &c. but it soon rots if exposed to the weather. It spreads very much, and is not easy to extirpate: but in the northern provinces of the American states, it is often killed by frost in hard winters.‖

In Virginia and Carolina there is great plenty of these trees in the woods: also in Pensylvania,

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* Pallas. † Parkinson. ‡ Ibid. § Ibid. ‖ Kalm.

Philadelphia, New Jersey, &c. for the most part in wet places, round the water-pits. It is known by the name of *Pishamin* or *Persimon*.

CULTURE.

Species 1, 2, are both propagated by seeds, which will come up very well in the open ground; but if they are sown upon a moderate hot-bed, the plants will come up much sooner, and make a greater progress; but in this case the seeds should be sown in pots or boxes of earth, and plunged into the hot-bed, because the plants will not bear transplanting till autumn, when the leaves fall off; so that when the plants are up, and have made some progress, they may be inured by degrees to the open air; and in June they may be wholly exposed, and may remain abroad until November, when it will be proper to set the pots under a hot-bed frame to protect them from hard frost, which, while they are very young, may kill the tops of the plants; but they must have as much free air as possible in mild weather. The following spring, before the plants begin to shoot, they should be transplanted into a nursery, in a warm situation, where they may be trained up for two years, and then removed to the places where they are to remain. These are both hardy enough to resist the greatest cold of this country, after the plants have acquired strength.

Genus 15. ELÆAGNUS. *Oleaster*. Class IV. Tetrandria. Order I. Monogynia.

Species 1. *Narrow-leaved Oleaster*. (ELÆAGNUS ANGUSTIFOLIA.)

This is a tree, which branches from the bottom, growing sometimes to the height of twenty feet, with a trunk the thickness of a man's arm or thigh, elegant in its appearance, especially from the silvery brightness of the leaves. Bark smooth, brown. Wood pale, prettily veined with grey and brown, but not hard. Branches and branchlets slender, frequent, alternate, smooth, unarmed, or having thorns, especially in young trees. Leaves petioled, in the more northern parts lanceolate, in the more southern broader, rather obtuse, and larger; silvery white underneath, on their upper surface hoary greenish, and shining very much. The flowers come out at the middle leaves of the smaller branches, usually solitary or together, sometimes but very seldom three from each axil, in which case one or two are on shorter peduncles and barren, having no germ, though they have a style and anthers. In the desert near the Volga the fruit is hardly bigger than the berries of the Barberry, whereas in the more southern parts it is the size of the cornelian Cherry.*

Native of the South of Europe, the Levant, near the Caspian sea, in the deserts near the Volga, and the farther Tartarian desert, and other parts of the Russian empire of Asia. It flowers there in May. It was cultivated by Parkinson in 1633.†

Mr. Miller distinguishes specifically the thorny and unarmed narrow-leaved Oleaster. The latter, he says, is that which is most commonly preserved in the English gardens. The leaves are more than four inches long, and not half an inch broad; they are very soft, and have a shining appearance like sattin. The flowers come out at the footstalks of the leaves, singly, or two, and frequently three at the same place; the outside of the calyx is silvery and studded, the inside of a pale yellow; having a very strong scent. The flowers appear in July, and sometimes are succeeded by fruit.

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* Pallas. † Hort. Kew.

The thorny Elæagnus he takes to be the common sort, which grows naturally in Bohemia, and of which he saw some trees in the curious garden of the famous Boerhaave, near Leyden. The leaves of this are not more than two inches long, and about three quarters of an inch broad in the middle; they are white, and have a soft cottony down on their surface; at the footstalk of every leaf comes out a pretty long sharp thorn, the leaves being alternate, the spines come out on each side of the branches. The flowers are small, and have a strong scent when fully open. They were both observed by Tournefort in the Levant.

CULTURE.

The narrow-leaved Oleaster is extremely hardy, and seldom injured by frost; but it is not of very long life, and therefore young plants should be raised by seeds.

Genus 16. Euonymus. *Spindle-tree.* Class V. Pentandria. Order I. Monogynia.

Species 1. *Common Spindle-tree.* (Euonymus Europæus.)

The common Spindle-tree, when growing in hedges, is seldom seen of any considerable size, but is a shrub; if planted single, however, and properly trained, it will have a strong woody stem, and rise more than twenty feet high, dividing into many branches. Leaves lanceolate, about three inches long, and an inch and quarter broad in the middle, opposite, entire, of a deep green colour. The flowers come out at the end of May, or the beginning of June, in small bunches from the side of the stalks on slender peduncles. The petals are whitish, and spread in form of a cross.

The fruit ripens in October, at which time the seed-vessels spread open and expose the seeds, which being of a beautiful red colour, these shrubs make then a good appearance.

From its use for skewers it has the name of *Prick-wood*, and is called by Gerarde *Prick Timber-tree*. The wood is said to be used by the musical instrument makers. For skewers and toothpicks the branches should be cut when the shrub is in blossom, for it is then tough, and not easily broken; in that state it is also used by watch-makers, for cleaning watches. According to Linnæus, kine, goats and sheep eat it, but horses refuse it. No animal, however, seems to browze upon it but the goat. The berries are said to be fatal to sheep.

Species 2. *Broad-leaved Spindle-tree.* (Euonimus Latifolius.)

This rises with a stronger stem than the first, and grows to a larger size. The leaves are ovate-lanceolate, about four inches long, and two broad in the middle, opposite, entire, light green, on short foot-stalks. The flowers come out from the side of the branches, upon very slender peduncles, two inches and a half long, branching out into a loose bunch, and the flowers on separate pedicels. Petals five, at first white, but changing to purple. The same number predominates in the other parts of the fructification. The fruit is much larger than that of the common sort, and the peduncles being weak, it always hangs down. Native of Austria, Hungary, and most of the southern parts of Europe. This was seldom seen in England, till Mr. Miller procured it from France; and it is now become very common in the nurseries.

CULTURE.

1, 2. These sorts may be propagated either by seeds, or layers; if by seeds, they should be sown in autumn, soon after they are ripe; then the plants will come up the spring following;

but if the seeds are not sown till spring, the plants will not appear till the following spring, whereby a whole year is lost. The seeds should be sown upon a shady border, where they will succeed better than when they are more exposed to the sun. When the plants come up, they will require no other care but to keep them clean from weeds till the following autumn, when, as soon as their leaves decay, the plants should be taken up and transplanted into a nursery, in rows two feet distant, and the plants one foot asunder in the rows; in this place they may remain two years, and then they may be removed to the places where they are to remain.

Genus 17. Fagus. *Chesnut. Beech.* Class XXI. Monoecia. Order VIII. Polyandria.

Species 1. *Common Chesnut-tree.* (Fagus Castanea.)

The Chesnut-tree has its name Castanea, from Castanis, a town in Thessaly. This tree will grow to a very great size, and spread its branches finely on every side where it has room; but planted closely, will shoot up straight to a great height. The leaves are large, of a lucid green; they end in a long very taper point, and the serratures terminate in a kind of tender prickle; they are about four or five inches long, and two wide, somewhat wrinkled, having several transverse veins, prominent on the under surface, and proceeding from a strong midrib. The aments or catkins of male flowers are pendulous at the ends of the branches, very long, and resemble those of the walnut.* They have a strong spermatic smell; the flowers are collected in remote little balls, and are sessile. The proportion of male flowers to the females is prodigious. The stamens are about nine in number. In the female flowers the number of styles varies from four to seven, but six is the most common. The calyx becomes an echinate capsule of four valves, of a silky smoothness on the inside; and containing two nuts, sometimes three, or only one.†

The Chesnut, in maturity and perfection, says Mr. Gilpin, is a noble tree, and grows not unlike the oak. Its ramification is more straggling, but it is easy, and its foliage loose. This is the tree which graces the landscapes of Salvator Rosa, who painted in the mountains of Calabria, where it flourishes.

The Chesnut has long been naturalized to the southern countries of Europe. It is said that Tiberius Cæsar first brought it from Sardis in Lydia to Italy, whence it was propagated into France, and so among us.‡ It is indigenous in many parts of Asia, in China, Cochinchina, Japan, &c.

The Chesnut abounds now in the mountainous parts of Italy, in the South of France, in Switzerland, in the Valais, and many parts of the Alps towards Italy, in Corsica and Sicily, where it grows half way up mount Etna; also in Carniola, some parts of Germany, &c.

With us in England, says Miller, it was formerly in greater plenty than at present, as may be proved by the old buildings in London, which were for the most part of this timber; and there are remains of old decayed Chesnuts in the woods and chaces not far distant from London, particularly Enfield chace. I doubt very much, however, whether the timber supposed by Mr. Miller, and by architects in general, to be Chesnut in our buildings, be any thing more than Oak of a different grain, and inferior quality.

Mr. Evelyn makes little doubt but that the Chesnut is a native of this island. Dr. Ducarel is of the same opinion, and among the ancient records to which he appeals, produces a deed of gift from

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* Ray. † Haller, Scopoli, Ray. ‡ Evelyn.

Henry II. to Flexley Abbey, of the tithe of all his Chesnuts in the forest of Dean. The honourable Daines Barrington on the contrary (Philos. Trans. Vol. LXI.) thinks that it is not a native. It certainly is not in the woods north of Trent, and though it has been long in the southern parts, yet there is no appearance of its being indigenous.*

This tree seems to be very long lived, and grows to a very great size. The famous *Castagno de Cento Cavalli* on Mount Etna, as measured by Mr. Brydone in 1770, is two hundred and forty feet in circumference; some, however, have doubted whether this be really one tree. Brydone says, it had the appearance of five distinct trees, but that he was assured the space was once filled with solid timber, and that there was no bark on the inside. Kircher, about a century before Brydone, affirms that an entire flock of sheep might be commodiously inclosed within it, as in a fold. *Il Castagno del Galea*, of which there is no doubt, measured then seventy-six feet round, at two feet from the ground. But these trees grow on a deep rich soil, formed from the ashes of the volcano.

There are some fine Chesnuts on the banks of the river Tamur in Cornwall, at an old house belonging to the Edgecumbe family: and at Beechworth castle in Surry, there are not fewer than seventy or eighty trees measuring from twelve to eighteen or twenty feet in girt.

At Winley near Hitchin Priory in Hertfordshire, a Chesnut in 1789 girted somewhat more than fourteen yards at five feet above the ground; its trunk was hollow, and in parts open, but its vegetation was vigorous.†

In the park adjoining to the garden at Great Canford in Dorsetshire are four large Chesnut trees, one of them measuring thirty-seven feet round, still bearing fruit plentifully, though much shivered and decayed by age.‡

There was an old decayed tree at Fraiting in Essex, whose very stump yielded thirty sizeable loads of logs. And another in Gloucestershire containing within its bowels a pretty wainscotted room, enlightened with windows, and furnished with seats, &c.§ Ben Jonson, in his poem on Penshurst, makes mention of a Chesnut planted at the birth of Sir Philip Sidney.

In Ireland there are or have been many fine Chesnuts; as an avenue at Dunganstown, the estate of William Hoey, Esq. cut down in 1793; one of these measured fourteen feet three inches, another fifteen feet, and a third sixteen feet six inches round; the length of one was twenty-four feet, and another thirty-six.

The most remarkable of these trees in England is that at Tortworth, the seat of Lord Ducie in Gloucestershire. Even in the year 1150, says Bradley, it was stiled the great or old Chesnut tree of Tortworth; it fixes the boundary of the manor, and is probably a thousand years old at least. It girted fifty-one feet at six feet above the ground, about the year 1720: it divided at the crown into three limbs, one of which then measured twenty-eight feet and a half in girt, five feet above the crown. The soil in which the tree grows is a soft clay somewhat loamy, and the situation on the N. W. side of a hill.‖

Lord Ducie has a beautiful painting of this ancient tree. I have, says Professor Martyn, by the favour of his Lordship, an etching of it, made in the year 1772, under which is this inscription: "The east view of the ancient Chesnut tree at Tortworth, in the county of Gloucester, which measures nineteen yards in circumference, and is mentioned by Sir Robert Atkyns in his history of that county, as a famous tree in King John's time, and by Mr. Evelyn in his Sylva, to have been so remarkable for its magnitude, in the reign of King Stephen, as then to be called the great Chesnut of Tortworth,

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* Evelyn's Silva.

† Gilpin's For. Scen. 1. 59. & 141.

‡ Grose's Antiquities, Suppl. Vol. I.

§ M. S. Ord.

‖ Philos. Account, p. 176; also Gent. Mag. for 1766. p. 321, where is a figure of it.

from which it may reasonably be presumed to have been standing before the conquest." When this etching was made, it was barely included within the garden wall, which bore hard upon it; but the present Lord Ducie removed the incumbrance, and at the same time applied fresh earth to the roots, which seems to have enlivened it. So late as the year 1778 it produced great quantities of fruit, which though small, were sweet and well flavoured.

Mr. Lysons also has etched two views of this famous tree, from the S. W. and the N. W. He says that in 1701 it measured forty-four feet four inches round in the thickest part, which is much less than the dimension given by Bradley, and yet this is exceeded by that of Sir Robert Atkyns, who gives it nineteen yards. Sir Robert is of opinion that it was originally several trees; and Mr. Marshall thinks it to be two trees grown together. Sir Robert Atkyns mentions the tradition of its having been growing in the reign of King John; and Mr. Peter Collinson relying on the accounts of Evelyn and Bradley, supposed it to have been planted in the reign of King Egbert. But Mr. Lysons says, that there does not seem to be any authority to show at what period it became remarkable for its size, except a very vague tradition; and it could never have been a boundary of the manor, for it stands in the centre of it.

The Chesnut is a tree which deserves our care as much as any of the trees which are propagated in this country, either for use or beauty; being one of the best sorts of timber, and affording a good shade. The leaves continue late in the autumn, turning then to a golden colour; nor are they so liable to be eaten by insects as are those of the Oak, which of late years have frequently happened to the latter, and has rendered them very unsightly great part of summer, which I have never observed to be the case with the Chesnut, which renders them more valuable for parks and plantations for ornament; and there is no better food for deer, and many other animals, than their nuts, which most of them prefer to acorns; but yet there should not be many of these trees planted too near the habitation; because when they are in flower, they emit a very disagreeable odour, which is very offensive to most people.

The shade also of the Chesnut, like that of the Ash, is injurious to other plants; it should therefore be planted in thickets, or in detached plantations.* Or if these trees be planted in large wilderness quarters next the walks, or in woods by the side of the ridings; and left untrimmed as they ought to be, they will feather to the bottom, and hide the naked and crooked stems of other trees.†

To recommend the restoration of this noble and useful tree, which has unaccountably been in a manner lost among us, we must observe, that it may be cultivated in England so as to afford an equal profit without any other sort of timber tree; since the wood is equal in value to the best Oak, and for many purposes far exceeding it, particularly for casks, for which it is much used in Italy; and for pipes to convey water under ground. In Italy it is planted as coppice-wood, to make stakes for their vines, which will continue seven years.

It must therefore be very proper for stakes in espaliers and dead hedges, for hop-poles, hurdles, &c. It was formerly used for all the same purposes as Oak, in building, mill-work, and household furniture. And lately some of it that was finely variegated has been successfully employed in doors and ballustrades of a stair-case; a colour being given them, by rubbing them over with alum water, then laying on with a brush a decoction of logwood chips, and lastly a decoction of Brazil wood; they have been frequently taken for mahogany.

Some persons assert that the timber of Chesnut is brittle, and decays at heart; whilst, according to others, it will last longer than Oak, is not subject to cracks or flaws, and is never attacked by

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* Boutcher. † Evelyn's Silva by Hunter.

insects. Old Chesnut is very brittle, and apt to crack, and therefore should never stand longer than whilst it is in a growing state. If cut when it squares only six inches, it will be as durable as Oak of six times its size and age; having very little sap in proportion to other trees. The durability of it when exposed to the weather is sufficiently ascertained, from its use for gate-posts at Wellington in Somersetshire, of which the following is an account. In or about the year 1703, some gate-posts of Oak, and others of Chesnut were to be repaired; they had the appearance of being put in at the same time, but the latter were much more sound, insomuch that some of them were adjudged good enough to remain as gate-posts, and are now to be seen there (1788). Such as were too small were taken up, and set as posts to fix rails to. At the same time some new posts of Oak were put in, there not being enough of the old Chesnut posts. Though these were old when put in, twenty-five years ago, they are now (1788) more sound than the Oak posts which were then new. One side of the Chesnut posts was the outside of the tree, but the timber is as sound there as in any other part; which would not have been the case with Oak, the sap of which, next the bark, soon decays. The Chesnut gate-posts had been put down many years before 1745; they have therefore probably stood the weather above half a century.*

Another account says, that the branch of a Chesnut about thirteen inches square, which in the year 1726 was put down as a hanging post for a gate, and carried the gate fifty-two years, when taken up appeared perfectly sound, and was put down for a clapping-post in another place.

In 1743 a large barn was built with some of this timber, and is now (1792) sound in every part. About the same time several posts and rails were put down, which after standing thirty or forty years, generally appeared so sound, as to admit of being set up in some other place.

In 1772 a fence was made of posts and rails converted from young Oaks and Chesnuts of the same age and scantling. In 1791 this fence was removed, when the Chesnut posts were found as sound as when they were first put down; but those of Oak were so much wasted just below the surface of the ground, that they could not be used again without a spur.†

The nuts are the usual, and in some places almost the only food of the common people in the Apennine mountains of Italy, in Savoy, and some parts of the South of France; not only boiled and roasted, but also in puddings, cakes and bread. They are esteemed to be a very flatulent diet, and hard of digestion; yet there are instances in Italy of men's living to ninety or a hundred years of age, who have fed wholly on Chesnuts. They are brought even to fashionable tables in deserts. Mr. Ray mentions that they are eaten in Italy with orange or lemon juice and sugar; and that they are commonly sold there about the streets, roasted on a portable furnace; whence we may conclude that this luxury was unknown at London in the last century. These nuts are used for whitening linen cloth, and for making starch; they are reputed excellent for feeding hogs. The leaves also make useful litter, and mixed with the dung of the cattle are a good manure.‡

The foregoing account will, I hope, have some tendency to encourage the growth of this noble though neglected tree. Mr. Peter Collinson, who made no doubt of its being a native, assigned the great profits arising from Chesnuts when cut for hop-poles as the reason why it is so rare to see large trees in the woods.§ Let us hope, however, to see it rear its head again as a timber tree among us. An arret of the council at Paris was published in May in 1720, ordering that all the great roads in France should be planted with Chesnut or other such fruit or forest-trees as are suitable to the nature of the ground, at thirty feet distance from each other, and within six feet of the top of the ditch.‖

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* Transact. Soc. of Arts for 1789, p. 10, &c.
† Ibid. for 1792, p. 30.
‡ Boutcher.
§ Gent. Magazine.
‖ M. S. Ord.

Species 2. *Dwarf Chesnut-tree.* (Fagus Pumila.)

The Dwarf Virginian Chesnut seldom grows above twelve or fourteen feet high, but produces great plenty of nuts, which are, for the most part, single in each capsule. This tree is very hardy, and will resist the severest of our winters in the open ground, but is very apt to decay in summer, especially in a dry soil. But although it delights in moisture, yet if the wet continues long upon the ground in winter, it frequently destroys the trees. It is very common in the woods of America, but is rare in England, though it was cultivated so long since as 1699, by the Dutchess of Beaufort.*

Species 3. *Common Beech-tree.* (Fagus Sylvatica.)

The appellation is nearly the same in all the northern languages, and in all the dialects of the Sclavonian. In German, *Buche*, *Buke*, or *Boke*; in Danish, *Bog*; in Swedish, *Bok*; in Russian, Polish, &c. *Buk*. The French *Hêtre* is from the Germen *Hester*, which signifies a young Beech. In Italian it is *Faggio*, from the Latin. In Portugueze this is softened into *Faya*; and in Spanish into *Haya*; but in some provinces it is *Fagos*.

This tree will grow to a very large size, lofty and spreading, the trunk straight, and covered with a whitish bark. The leaves are smooth and glossy, waved on the edges rather than serrate, or slightly sinuate-toothed, three inches and more in length, and two or upwards in breadth: the petioles reddish, slightly grooved above, four or five lines in length, pubescent, as is also the midrib of the leaf. Stipules reddish-brown, shining, lanceolate, conspicuous. It retains the old leaves through the winter. The male catkins come out in bunches from the ends of the small branches; they are roundish, obtuse, half an inch long, and almost as broad; on peduncles from half an inch to fourteen lines in length, pendulous, round, and pubescent. Calyx cut half way into six sharp, villose, yellowish segments. Stamens uncertain (4, 6, 8, 9, 11, 12.), from the bottom of the calyx. The female aments come out from the same place, a little above the others; they are erect, and on round, whitish, villose peduncles, four lines or upwards in length: the common involucre has two flowers, is four-cleft, and covered with soft spines; calyx superior, six-leaved, tomentose: germ three-celled, with two rudiments of seeds in each cell; styles three (or one three-cleft. G.); stigmas awl-shaped, and slightly hooked, yellowish and smooth; at the top of the germ there are also six whitish villose segments, shorter than the styles. The fruit is composed of two nuts joined at the base, covered with an almost globular four-valved involucre, with soft spines on the outside, but within very smooth and silky: the nuts when ripe are one-celled and triangular; and contain one or two angular seeds.†

The Beech is native of the greater part of Europe, and the southern provinces of the vast Russian empire; but it is not fond of very high or cold situations, nor is it found in the northern provinces of Sweden. Mr. Lightfoot doubts whether it be indigenous in Scotland; and Mr. Marshall thinks it is not a native of the northern counties in England; it prospers in a chalky and rocky soil, but not in light lands. It thrives prodigiously in sheltered bottoms, and of all exposures most dislikes the west. In some parts of Hertfordshire, where the soil is a strong clay full of flints, this tree grows to a great size, and is extremely beautiful.

Mr. Arthur Young (Travels in France, p. 7.) speaks of a Beech in Chantilly, as the finest he ever saw; straight as an arrow, and not less than eighty or ninety feet high; forty feet to the first branch, and four yards in diameter at five feet from the ground.

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* Hort. Kew. † Pollich, Haller, Gærtner.

In Ireland several fine Beeches are mentioned, though it is not supposed to be a native of the island. As at Tiny Park, the seat of Sir Skeffington Smyth, Bart. three noble trees together, the smallest fourteen feet round, the next fifteen feet six inches at the butt, and fourteen feet eight inches at seven feet from the ground, the third is sixteen feet three inches round, and continues nearly of the same girt for thirty-six feet.

Beech, says the late Mr. White, is one of the most grand and lovely of all the forest trees, whether we consider its stately trunk, its smooth silvery rind, its glossy foliage, or graceful spreading pendulous boughs. No tree, says another, is more beautiful when standing singly in parks or ornamental grounds, as it throws out its branches very regularly, and feathers almost to the ground. In woods or groves it grows clear of branches to a great height.*

Mr. Gilpin is not inclined to rank the Beech much higher in picturesque beauty than in utility. Its trunk, he allows, is often highly picturesque, being studded with bold knobs and projections, and having sometimes a sort of irregular fluting, which is very characteristic. The bark, too, wears often a pleasant hue; it is naturally of a dingy olive, but is overspread, in patches, with a variety of mosses and lichens: its smoothness also contrasts agreeably with these rougher appendages. This is all the merit Mr. Gilpin allows to the Beech: for we rarely see it well ramified; and in full leaf it has the appearance of an overgrown bush. Virgil, indeed, was right in choosing the Beech for its shade, for no tree forms so complete a roof, but its bushiness gives it a great heaviness. The Beech is most pleasing in its juvenile state. A light airy young tree, with its spiry branches hanging in easy forms, is often beautiful. Some of the finest oppositions of tint in the autumn arise from the union of this tree with the oak.†

The Beech is very well adapted to form lofty hedges, to surround plantations or large wilderness quarters, or for screens where there is not room for trees to extend their branches naturally. Although the timber of this tree is not so valuable as that of many others, yet as it grows very fast in chalky or stony ground of little value, with a clear smooth bark, and straight trunk; as it will thrive on such soils and in such situations as better trees will scarcely grow in; and as it will resist winds on the declivities of hills better than most other trees, the planting of it should be encouraged, especially as it affords an agreeable shade, and the leaves both make a fine appearance in summer, and continue green as long in autumn as any of the deciduous trees; when they turn brown or orange, and frequently hold on all the winter. In parks, therefore, and other plantations for pleasure, this tree deserves to be cultivated among those of the first class, especially where the soil is adapted to it.

But though the wood of the Beech be brittle, and decays soon in the air, yet it will endure long under water, and serves for a great variety of uses, as will appear from the following account. It is of great use to turners for making trenchers, dishes, trays, buckets, &c. to the joiner for stools, bedsteads, and other furniture; to the wheeler and millwright. It makes shovels and spade-graffs for the husbandman, and is useful to the bellows-maker. Floats for fisher's nets, instead of corks, are made of its bark. It is good for fuel, billet, bavin and coals, though one of the least lasting; and its very shavings are good for the fining of wine. If the timber lie altogether under water, it is little inferior to Elm. Baskets for strawberries, &c. are made of the bark. Of the thin lamina or scale of the wood, scabbards for swords, band-boxes, hat-cases, &c. The leaves are used abroad, on account of their elastic quality, instead of straw for their *paillasse* to lay under their mattrasses. To this enumeration of uses by Mr. Evelyn, we may add many others. It is now in much use

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* Woodw. in With. † Forest Scenery, 43, &c.

among the cabinet-makers for chairs, both plain and painted, for bedsteads, with the posts frequently stained the colour of mahogany. It is used in the country for rafters in building. Much of it is cut out into quarters and planks for various purposes; and barn-floors are frequently laid with it. The mill-wright uses it for cogs, &c. and the wheel-wright for spokes and fellies. It goes to the dock-yards for wedges, and may be used in ship's bottoms from the keel to the floor-heads; and to the coal-mines under the name of Newcastle railing. Being of an even grain, and without knots, it makes beautiful benches and railing for public rooms, and many sorts of inside work in houses. It is formed into gun-stocks, tool-handles, mallets, carpenters planes, &c. heel-pieces, and pegs for heels, and is used for the sounding boards of harpsichords, &c. by the musical-instrument makers. It is cut into pipe-staves for dry goods, especially by the soap-cask coopers, for whose use a considerable quantity is imported in ballast from Bremen and Dantzick, in slabs and clapboards about five feet in length. It is said that these coopers consume from twenty to thirty thousand of these clapboards yearly, except in time of war, when the importation is stopped. It is excellent fuel, and in burning affords a large quantity of pot-ash. Much of it is sent to the Metropolis under the name of London billet, for the use of the bakers, glasshouses, &c. The stack-wood, which is made up of the branches, is burnt chiefly into charcoal. The nuts, or mast, as they are commonly called, fatten swine, but the fat is not firm; and they are greedily devoured by mice, squirrels and birds; they are said to occasion giddiness and head-ach; but when dried and powdered to make wholesome bread: roasted, they are sometimes substituted for coffee: the poor people in Silesia use the expressed oil instead of butter. At the beginning of this century Aaron Hill had a project for paying off the national debt with the oil of Beech-nuts! But they seem to yield little oil in northern countries; in Sweden, Linnæus informs us, scarcely any can be expressed from them.

If the soil be tolerably good, Beech will become fit to be felled in twenty-five years. The woods are then drawn, as it is called; that is, the trees fit for fire-wood or billet, poles, timber, &c. are taken down, and no crooked trees are suffered to remain. Formerly it was the custom to leave old stools to produce new trees, but as these seldom grow well and handsome, now during the winter the old stools are grubbed up, and the plants which spring spontaneously from the mast are encouraged to supply the places of the trees which are taken down. Once in six or seven years this operation of drawing the woods may be repeated; and thus there is a constant and regular succession of trees fit to cut. The price which fire-wood or billet fetches in Buckinghamshire is near four-pence the foot solid measure. The poles and better stuff for gun-stocks, wedges, &c. sell for five-pence the foot. The largest trees for mill-wrights, &c. sell for six-pence or seven-pence the foot. Stackwood is fifteen or sixteen shillings the load: and faggots fifteen or sixteen shillings the hundred.

Whatever may have been the case with respect to our island in Cæsar's time, the Beech is now no uncommon tree in many considerable tracts of it, particularly on that great ridge of chalk hills which runs from Dorsetshire, through Wiltshire, Hampshire, Surry, Sussex, and Kent, branching out into Berkshire, Buckinghamshire, and Hertfordshire. On the declivities of Cotswold and Stroudwater hills of Gloucestershire, and on the bleak banks of the Wye, in the counties of Hereford and Monmouth. It is indeed to be found in almost every county of England.

Some plantations of it have been lately made by the Earl of Fife, in the county of Murray, where his Lordship has planted near two hundred thousand of these trees. George Ross, Esq. has also set 13,000 of them in Cromarty. In England, John Sneyd, Esq. has planted above 14,000 at Belmont in Staffordshire, between the years 1784 and 1786. And the Bishop of Llandaff 2000 at Ambleside in the year 1789.

CULTURE.

Species 1, is propagated by planting the nuts in February, in beds of fresh undunged earth. The best nuts for sowing, are such as are brought from Portugal and Spain, and are commonly sold in winter for eating, provided they are not kiln-dried, which is generally the case of most of those brought from abroad, which is done to prevent their sprouting or shooting in their passage; therefore, if they cannot be procured fresh from abroad, it will be much better to use those of the growth of England, which are full as good to sow for timber or beauty as any of the foreign nuts, though their fruit is much smaller: these should be preserved until the season for sowing, which is the beginning of March, in sand, where mice and other vermin cannot come to them, otherwise they will soon destroy them: before you set them, it will be proper to put them into water to try their goodness, which is known by their weight; those that swim upon the surface of the water should be rejected as good for nothing; but such as sink to the bottom, you may be sure are good.

In setting these seeds or nuts, the best way is, to make a drill with a hoe, as is commonly practised in setting Kidney Beans, about four inches deep, in which you should place the nuts, at about four or six inches distance, with their eye uppermost; then draw the earth over them with a rake, and make a second drill at about a foot distance from the former, proceeding as before, allowing three or four rows in a bed, with an alley between, three feet broad, for a convenience of clearing the beds, &c. When you have finished your plantation, you must be careful that it is not destroyed by mice, or other vermin; which is very often the case, if they are not prevented by traps, or other means.

In April these nuts will appear above ground; you must therefore observe to keep them clear from weeds, especially while young: in these beds they may remain for two years, when you should remove them into a nursery, at a wider distance. The best season for transplanting these trees, is either in October or at the end of February; but October is the best season: the distance these should have in the nursery, is three feet row from row, and a foot or eighteen inches in the rows: you must be careful in transplanting these trees, to take them up without injuring their roots, nor should they remain long out of the ground; but if they have a downright tap-root, it should be cut off, especially if they are intended to be removed again; this will occasion their putting out lateral roots, and render them less subject to miscarry when they are removed for good.

The time generally allowed them in this nursery, is three or four years, according to their growth; but the younger they are transplanted, if designed for timber, the better they will succeed; during which time you should be careful to keep them clear from weeds, observing also to prune off lateral branches, which would retard their upright growth, and where you find any that are disposed to grow crooked, either by their upper bud being hurt, or from any other accident, you may the year after planting, in March, cut them down to the lowermost eye next the surface of the ground, which will cause them to make one strong upright shoot, and may be afterwards trained into good straight trees: but this should not be practised, unless the plants have absolutely lost their leading shoot; for although the stems of the trees should be very crooked, as is generally the case with them when young, yet when they are transplanted out, and have room to grow, as they increase in bulk, they will grow more upright, and their stems will become straight, as I have frequently observed where there have been great plantations made of them.

But in doing this, you must be careful not to disturb or break their roots, which, perhaps, might destroy them. These trees require no other manure than their own leaves, which should be suffered to rot upon the ground; and in the spring of the year, the ground should have a slight digging,

when these should be buried between their roots, but not too close to the trees, which might be injurious to their young fibres.

After having remained three or four years in the nursery, they will be fit for transplanting, either in rows to grow for timber, or in quarters for wilderness plantations, avenues, clumps, or the orchard: but if you intend them for timber, it is by much the better method to sow them in furrows, as is practised for Oaks, &c. and let them remain unremoved; for these trees are apt to have a downright tap-root, which, being hurt by transplanting, is often a check to their upright growth, and causes them to shoot out into lateral branches, as is the case with the Oak, Walnut, &c.

But where the fruit of them is more sought after, then it is certainly the better way to transplant them; for as transplanting is a check to the luxuriant growth of trees, so it is a promoter of their fructification, as may be evinced by observing low shrubby Oaks, Walnuts, &c. which generally have a greater plenty of fruit than any of the larger and more vigorous trees; and the fruit of such trees is much superior in taste, though the seeds of vigorous trees are vastly preferable for plantations of timber; for it is a constant observation, that, by saving seeds from dwarf trees or plants, from time to time, they may be rendered much lower in their growth than is their natural size; but where the fruit is most desired, then they should be taken from such trees as produce the largest and sweetest nuts, which are commonly found upon such trees as spread the most, and have horizontal roots; for the weaker trees being less capable to furnish a supply of nourishment, and having a greater quantity of fruit upon them, and to which this must be distributed, together with their roots lying near the surface of the ground, by which means the juices are better prepared by sun, air, &c. before it enters their vessels, it is certain their juices are better digested, and their fruits better maturated, than those can possibly be which grow upon strong vigorous trees, which have long tap-roots running several feet deep into the earth, and consequently take in vast quantities of crude unprepared juice, which is buoyed up to the extreme parts of the tree; and these seldom having many lateral branches to digest and prepare their juice, by perspiring and throwing off the crude part before it enters the fruits.

And this, I dare say, universally holds good in all sorts of fruit trees, and is often the occasion of the good and bad qualities of the same sorts of fruits growing on the same soil.

Species 2. The nuts of the dwarf Virginian Chesnut should be put up in sand, in America, as soon as they are ripe, and sent out immediately, otherwise they lose their vegetating quality. When the nuts arrive, they should be put into the ground as soon as possible, and if the winter should prove severe, cover the ground with leaves, tan or peas-haulm, to prevent the frost from penetrating to the nuts.

Species 3. The Beech-tree is propagated by sowing the mast, the season for which is any time from October to February; only observing to secure the seeds from vermin when early sowed: if this be carefully done, the sooner they are sown the better, after they are full ripe. Since Beech-mast, however, keeps very well, and it is greatly relished by Field-mice and other vermin, many planters prefer spring-sowing; in which case the seeds should be spread on a mat in an airy place, for a few days, to dry, and then put up in bags.

A small spot of ground will be sufficient for raising a great number of these trees from seed. They must be kept clean from weeds; and if they come up very thick, drawing the strongest the autumn following: and thus if a seed-bed be husbanded carefully, it will afford a three years' draught of young plants, which should be planted in a nursery; and, if designed for timber trees, at three feet distance row from row, and eighteen inches asunder in the rows. But if they are designed for hedges, two feet row from row, and one foot in the rows will be sufficient. In this nursery they may remain two or three years; observing to clear them from weeds, and to dig up the ground

between the rows, at least once a year; but be careful not to cut or bruise the roots, and never to dig the ground in summer, when it is hot and dry.

The Beech will prosper on stony, barren soils; but then the nursery for the young plants ought to be upon the same soil: for if they be raised in a good soil and a warm exposure, and afterwards transplanted into a bleak barren situation, they seldom thrive.

Mr. Young informs us, in his Irish Tour, that Mr. Mahon made a plantation of all sorts of forest trees in his park, in order to see how far the deer would let them escape. They devoured every tree except the Beech, not one of which they touched, either leaf, branch, or bark. Many of his Beeches, not more than thirty years growth, were three or four feet in girt, and from thirty to forty feet high.

Genus 18. Fothergilla. *Fothergilla.* Class XIII. Polyandria. Order II. Digynia.

Species 1. *Broad-leaved Fothergilla.* (Fothergilla Alnifolia Obtusa.)

This tree has a great appearance to the Alder. It is a native of North America, and was introduced in 1765 by Mr. John Bush. It is flowers from April to June.

CULTURE.

It is raised from seed brought from America in sand.

Genus 19. Fraxinus. *Ash-tree.* Class XXIII. Polygamia. Order. Dioecia, et Trioecia.

Species 1. *Common Ash-tree.* (Fraxinus Excelsior.)

The leaves have generally five pair of leaflets, and one odd one, of a dark green. The flowers are produced in loose spikes from the side of the branches, and are succeeded by flat seeds which ripen in autumn.

The lateral buds produce the flowers, and the terminating one the leaves.*

Bractes linear, one on the outside at the base of each pedicel. Filaments broad and flat, not so long as the anthers, which are of a blackish purple colour.† There are not only bisexual and female flowers, but also male ones, so that this species should seem referable to the order trioecia.‡ Care should be taken in observing the flowers; for in those which are bisexual, the germ which lies between the two stamens, does not grow up till some days after they appear, so that at first they appear to be male flowers. What Linnæus calls a seed, others call a capsule; the seed being covered with a leathery kind of crust, which does not split or open.

The varieties of the common Ash-tree are, 1. That with simple leaves, which, however, sometimes has them lobed and even ternate. 2. With pendulous branches, called the *Weeping Ash.* I have for near forty years known a very fine tree growing naturally so, at Gamlingay in Cambridgeshire; and it is not uncommon in trees of considerable age, especially when growing by the water

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* Linn. Spec. † Withering. ‡ Stokes in With.

side, to see the branches hang down. This variety is now become common in the nurseries, but they are engrafted, and carry too much the appearance of art. Imitations seldom are successful, and none of the weeping trees will ever vie with the Babylonian Willow. 3. With variegated leaves, both yellow and white; or gold-striped and silver-striped, as the nurserymen call them.

Micheli has some other varieties, from the different shape of the fruit, the size and form of the leaves, &c. *Nov. gen.* 222.

The English is from the Saxon *Æsc*. Ray says it has its name from the colour of the bark.

We must be careful not to confound, as some have done, this tree with the Mountain Ash, which is totally different from it. This has the epithet *excelsior* from the loftiness of the trunk—that of *mountain*, from the loftiness of the situation which it delights in.

Its usual form of flowering is in March and April, sometimes so late as May: of leafing from April 22, to May 15. Both are sometimes much injured by spring frosts.

The timber of the Ash is next in value to the oak, and in some places equal to it. It is hard and tough, and of excellent use to the coach-maker, wheel-wright, and cart-wright, for ploughs, axle-trees, fellies, harrows, and many other implements of husbandry; for ladders, oars, blocks for pullies, &c. &c. It makes a very sweet fuel, with little smoke, but is apt to crack and fly in burning.—Anciently it was in great request for spears.

For drying herrings no wood is like it, and the bark is good for the tanning of nets: being not apt to split and scale, it is excellent for tenons and mortises; also for the cooper, turner and thatcher: nothing is like it for palisade hedges, hop-yards, poles and spars; handles and stocks for tools, &c. When curiously veined, the cabinet-makers use it, and call it Green Ebony.*

By a remark in Harrison's description of England, prefixed to Holingshed, chap. xix. edit. 1586. it is plain, that the Ash was then esteemed the properest tree for hop-poles.—"Poles are accounted to be their fairest charge (of hops). But sith men have learned of late to sow ashen keies in ash yards by themselves, that inconvenience in short time will be redressed."†

Ash-pollards are of great service where fuel is scarce; a few of them will produce many loads of lop. The loppings make the sweetest of all fires, and will burn well either green or dry; only if the branches are suffered to grow too large, the lopping will proportionably injure the tree.‡

If a wood of these trees be rightly managed, it turns greatly to the advantage of its owner; for by the underwood, which will be fit to cut every seven or eight years for hoops, or every fourteen years for hop-poles, &c. there will be a continual income more than sufficient to pay the rent of the ground, and all other charges, and still there will be a stock preserved for timber, which in a few years will be worth forty or fifty shillings the tree.

The best season for felling the ash is from November to February; for if it be done either too early in autumn, or too late in the spring, the timber will be subject to be infested with worms, and other insects; but for lopping pollards, the spring is preferable for all soft woods. Mr. Boutcher recommends February.

The ashes of the wood afford very good pot-ash. The bark is used for tanning calf-skin: a slight infusion of it appears of a pale yellowish colour when viewed against the light, but when looked down upon or placed between the eye and an opake object, it is blue. This blueness is destroyed by the addition of an acid, and alkalies recover it again. It will give a good, though not beautiful green, to cloths which have been blued.§

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* Evelyn.
† Gentlem. Mag. for 1785, p. 599.
‡ Hunter's Evelyn.
§ Withering and Stokes.

In the north of Lancashire they lop the Ash to feed the cattle in autumn, when the grass is upon the decline; the cattle peeling off the bark.' In queen Elizabeth's time the inhabitants of Colton and Hawkshead fells remonstrated against the number of forges in the country, because they consumed all the loppings and croppings, which were the sole winter food for their cattle.' In forests, the keepers browze the deer on summer evenings with the spray of ash, that they may not stray too far from their walk.' The leaves have been gathered to mix with tea; and poor people in some places have made a considerable advantage by collecting them for this purpose.'

If any cows eat of the leaves or shoots, the butter which is made of their milk will be rank; which is always the case with the butter which is made about Guilford and Godalmin, and in some other parts of Surry, where there are Ash-trees growing about all their pastures: and in good dairy countries they never suffer an Ash-tree to grow.

The truth of this fact is doubted by others; for it is certain that there is no taste in ash leaves to countenance the assertion, and that this is the next tree after the elm which the Romans recommended for fodder.'

Though it be a handsome tree, the Ash ought not by any means to be planted for protection, or ornament, because the leaves come out late, and fall early. The fertile trees also generally exhaust themselves so much in bearing keys or fruit, that their foliage is scanty, and their appearance unsightly. The trees, however, which bear female flowers only, have a full and verdant foliage, and make a handsome figure, though late in the season.' It is well calculated for standards and clumps in large parks and plantations, and for groves and woods.' "Fraxinus in sylvis pulcherrima."—It will grow in very barren soil, and in the bleakest and most exposed situations.' It is so hardy as to endure the sea winds well, and may therefore be planted on the coast, where few trees will prosper. If planted by ditch sides, or in low boggy meadows, the roots act as underdrains, and render the ground about them firm and hard; the timber, however, is in this case but of little value. It was natural that our remote ancestors, when the island was over-run with wood, should value trees rather for their fruit than their timber: it is no wonder, then, that by the laws of Howel Dda, the the price of an oak or a beech should be 120 pence, while the ash, because it furnished no food for swine, was valued only at four-pence.

It is not common to see the Ash of a very great size: instances, however, of large trees are not wanting. Dr. Plot mentions one of eight feet diameter, valued at thirty pounds. Mr. Marsham informs us of another in Benel church-yard near Dunbarton in Scotland, measuring in 1768, sixteen feet nine inches in girt, at five feet from the ground. Mr. Evelyn says that divers were lately sold in Essex, in length one hundred and thirty-two feet. Mr. Arthur Young, in his Irish Tour, mentions some of seventy and eighty feet in height, which were only of thirty-five years growth. The trunk of one on the bank of the Avonmore was above fourteen feet round, and carried nearly the same dimensions for eighteen feet. An Ash at Dunganstown is twelve feet round, and quite clear of branches for thirty feet, where it measures ten feet round, and the arms extend in beautiful forms twenty-eight yards. At Tiny Park is another, the circumference of which in the smallest part somewhat exceeds nineteen feet, or six feet four inches diameter. At Luttrelstown, the seat of the Earl of Carhampton, are several Ash-trees from eleven to thirteen feet six inches round; one here was

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[1] Stokes in Withering.
[2] Gilpin's For. Scen. 2. 230,
[3] Gent. Mag. as above.
[4] Ibid.
[5] Pennant's Tour 1772, p. 29.
[6] Gent. Mag. as above.
[7] Hunter's Evelyn.
[8] Boutcher.
[9] Lightfoot.

sold for thirteen pounds. At Leixlip castle is a row of eighteen Ash-trees, on a very bleak exposure, measuring from nine to twelve feet round, with fair stems of considerable height, and fine branching heads. At Donirey near Clare castle in the county of Galway, is an old Ash that at four feet from the ground measures forty-two feet in circumference, at six feet high thirty-three feet; the trunk has long been quite hollow, a little school having been kept in it; there are few branches remaining, but these are fresh, and very vigorous. Near Kennity church in the King's county is an Ash whose trunk is twenty-one feet ten inches round, and it is seventeen feet high before the branches break out; these are of enormous bulk. When a funeral of the lower class passes by, they lay the corpse down for a few minutes, say a prayer, and then throw a stone to increase the heap, which has been accumulating round the root. Finally, in the church-yard of Lochabar in Scotland, Dr. Walker measured the trunk of a dead Ash, which at five feet from the surface of the ground, was fifty-eight feet in circumference.

The facility with which the Ash is propagated, and adapts itself to any soil or situation, even the worst; the quickness of its growth, and the general demand for the timber in every part of the country, for a variety of rural and economical purposes, recommend this tree very much to the planter. As a farther encouragement, Mr. Boutcher has given an instance of the great profit of an Ash plantation, in a small experiment, which he thus relates.

On half a rood of heavy meadow, chiefly barren red clay and moss, he planted Ash-trees six years old, and eight feet high, in rows four feet asunder, and two feet distance in the row; after four years he cut them down within five inches of the ground. Having more than he wanted, in seven years he sold half for pollards and hoops for forty shillings. In six years he cut them again, and sold them at the same price. There remained now twenty trees, intended to stand for timber, but he was obliged to sell them at twenty-three years growth for seven shillings a tree. Thus would an acre of indifferent ground properly situated for sale yield in twenty-three years one hundred and fifteen pounds ten shillings, without any other expense than digging the ground for the first five or six years, and cutting the coppice. Care should be taken to cut them slanting, with a sharp instrument, leaving all the wounds smooth and clean. Observe that no price is mentioned for the first cutting, which he used himself; and that he found he should have had at least one third more for the price of the last cutting. He also found that he had planted too thick, and that he should have had more wood, if the rows had been six feet asunder, and the sets three feet distant in the row.

Species 2. *Manna Ash-tree.* (Fraxinus Rotundifolia.)

The shoots of the Manna Ash are much shorter, and the joints closer together than those of the common Ash: the leaflets are shorter, with deeper serratures on their edges, and of a lighter green: the flowers come out from the side of the branches, are of a purple colour, and appear in the spring before the leaves come out. This tree is of humble growth, seldom rising to more than fifteen or sixteen feet in height in England.

It was cultivated here in 1697, by the Dutchess of Beaufort.*

The lower parts of the mountains in Calabria abound with the Manna Ash, which grows spontaneously, and without any culture; except that the woodmen cut down all the strong stems that grow above the thickness of a man's leg. Towards the end of July, the gatherers of manna make an horizontal gash, inclining upwards, in the bole of the tree. As the liquor never oozes out

* Hort. Kew.

the first day, another cut is given on the second, and then the woodman fixes the stalk of a maple leaf in the upper wound, and the end of the leaf in the lower one, so as to form a cup to receive the gum as it distills from each slash. The season continues about a month. The men have only three carlines (one shilling and three halfpence) for every rotolo; which quantity, containing thirty-three ounces and a third, is sold for twenty-four carlini and three quarters, or somewhat more than ten shillings; if it be in tubular pieces, the price one third.* These pieces are called *Manna in cannoli*, and these regular tubes are produced, by applying to the incision thin straw, or small bits of shrubs, upon which the manna runs as it oozes out.† The trees succeed best in an eastern exposure, in order to warm the juices in the morning, and to inspissate those which the heat has sweated out in the evening.‡

Species 3. *Flowering Ash-tree.* (Fraxinus Ornus.)

The petioles of this are equal, in the common Ash margined; the leaflets are also equal; in the common Ash the odd one is larger than the rest.

Species 4. *American Ash-tree.* (Fraxinus Americana.)

The fruits or keys are the same as in the common Ash, but much smaller and narrower. There are several varieties of this, as the White Ash, Red Ash, Black Ash, &c.

CULTURE.

The common Ash propagates itself in plenty by the seeds which scatter in the autumn, so that where the seeds happen to fall in places where cattle do not come, there will be plenty of the plants come up in the spring; but where any person is desirous to raise a quantity of the trees, the seeds should be sown as soon as they are ripe, and then the plants will come up the following spring: but if the seeds are kept out of the ground till the spring, the plants will not come up till the year after: it is the same with all the sorts of Ash; so that when any of their seeds are brought from abroad, as they seldom arrive here before the spring, the plants must not be expected to appear till the next year; therefore the ground should be kept clean all the summer where they are sown, and not disturbed, lest the seeds should be turned out of the ground, or buried too deep to grow; for many persons are too impatient to wait a year for the growth of seeds, so that if they do not come up the first year, they dig up the ground, and thereby destroy the seeds.

When the plants come up, they must be kept clean from weeds during the summer; and if they make good progress in the seed-bed, they will be fit to transplant by the autumn; therefore there should be some ground prepared to receive them, and as soon as their leaves begin to fall, they may be transplanted.

In taking them up, there should be care taken not to break or tear off their roots; to prevent which, they should be taken up with a spade, and not drawn up, as is frequently practised; for as many of the plants which rise from seeds will outstrip the others in their growth, so it is frequently practised to draw up the largest plants, and leave the smaller to grow a year longer before they are transplanted; and to avoid hurting those which are left, the others are drawn out by hand, and thereby many of their roots are torn off or broken; it is much the better way to take all up, little

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* Swinburn. † Philos. Trans. Vol. LX. ‡ Symonds in Young's Ann. 3. 161.

or big together, and transplant them out, placing the larger ones together in rows, and the smaller by themselves.

The rows should be three feet asunder, and the plants a foot and a half distance in the rows; in this nursery they may remain two years, by which time they will be strong enough to plant where they are to remain; for the younger they are planted out, the larger they will grow; so that where they are designed to grow large, they should be planted very young; and the ground where the plants are raised, should not be better than where they are designed to grow; for when the plants are raised in good land, and afterwards transplanted into worse, they very rarely thrive; so that it is much the best method to make the nursery upon a part of the same land, where the trees are designed to be planted, and then a sufficient number of trees may be left standing upon the ground, and these will outstrip those which are removed, and will grow to a larger size.

Where people live in the neighbourhood of Ash-trees, they may supply themselves with plenty of self-sown plants, provided cattle are not suffered to graze on the land, for they will eat off the young plants, and not suffer them to grow; but where the seeds fall in hedges, or where they are protected by bushes, the plants will come up and thrive.

Species 2, &c. The other sorts are commonly propagated in the nurseries by budding or ingrafting upon the common Ash; but are not so valuable as those which are raised from seeds, because the stock grows much faster than the grafts; so that the lower part of the trunk, so far as the stock rises, will often be twice the size of the upper; and if the trees stand much exposed to the wind, the grafts are frequently broken off from the stock, after they are grown to a large size.

Fraxinus Ornus is generally planted for ornament, the flowers making a fine appearance when they are in beauty, for almost every branch is terminated by a large loose panicle; so that when the trees are large, and covered with flowers, they are distinguishable at a great distance.

All the other sorts serve to make a variety in plantations, but have little beauty to recommend them; and as their wood seems to be greatly inferior to that of the common Ash, there should be few of these planted, because they will only fill up the space where better trees might grow.

Genus 20. GLEDITSIA. *Acacia.* Class XXIII. Polygamia. Order II. Dioecia.

This tree is common in most parts of North America, where it is known by the name of Honey Locust; it is called by the gardeners here Three-thorned Acacia. It rises with an erect trunk to the height of thirty or forty feet, and is armed with long spines, three or four inches long, which have two or three smaller ones coming out from the side, and are frequently produced in clusters at the knots of the stem. Leaves bipinnate, composed of ten pairs of leaflets, of a lucid green and sessile. The flowers come out from the side of the young branches, and being of an herbaceous colour, make no figure. Legume near a foot and half long, and two inches broad. Seeds smooth, surrounded by a sweet pulp.

The leaves seldom come out till June in this country, and the flowers not till the end of July. This tree does not produce any flowers till it is of a large size. There was one in the Bishop of London's garden at Fulham, which produced pods in the year 1729, that came to their full size, but the seeds did not ripen.

It appears from Plukenet that it was cultivated by Bishop Compton in 1700.*

* Hort. Kew.

CULTURE.

These trees are propagated by seeds, which must be procured from America; those of the first are annually sent to England in plenty, by the title of Locust, or Honey Locust, to distinguish it from the false Acacia, which is frequently called Locust-tree in America; these seeds may be sown upon a bed of light earth in the spring, burying them half an inch deep; and if the spring should be dry, they must be frequently watered, otherwise the plants will not come up the first year, for sometimes the seeds remain two years in the ground before they come up; therefore those who are desirous to save time, should sow the seeds as soon as they arrive, and plunge the pots into a moderate hot-bed, observing to water them frequently; by this method most of the plants will come up the same season, but these should be gradually inured to bear the open air, for if they are continued in the hot-bed, they will draw up weak; during the summer season, those plants in pots will require frequent waterings, but those in the full ground will not dry so fast, therefore need no water, unless the season should prove very dry. In autumn, those in the pots should be placed under a hot-bed frame to protect them from frost, for these young plants generally keep growing late in the summer, and the upper part of their shoots being tender, the early frosts of the autumn often kill the ends of them, if they are not protected, and this frequently occasions great part of the shoots to decay in winter; for which reason those plants in the full ground should be covered with mats in autumn, on the first appearance of frost; for a small frost in autumn will do more mischief to these young shoots which are full of sap, than severe frost when the shoots are hardened.

The following spring they may be transplanted into nursery-beds, at a foot distance row from row, and six inches asunder in the rows; but this should not be performed till April, after the danger of hard frost is over; for as the plants do not put out their leaves till very late, there will be no hazard in removing them any time before May. If the season should prove dry, they must be watered; and if the surface of the beds is covered with moss, or mulch, to prevent the earth from drying, it will be of great service to the plants. In these beds the plants may remain two years, during which time they must be constantly kept clean from weeds; and in the winter there should be some rotten tan, or other mulch, spread over the surface of the ground to keep out the frost. If the plants thrive well, they will be fit to transplant to the places where they are to remain after two years growth, for they do not bear removing when large; the best season for transplanting these trees, is late in the spring; they thrive best in a light deep soil, for in strong shallow ground they become mossy, and never grow large; they should also have a sheltered situation, for when they are much exposed to winds, their branches are frequently broken in the summer season, when they are fully clothed with leaves.

This being an elegant tree, it should appear singly in the openings of plantations, provided it be well sheltered from cold winds, but it is not in full leaf till the month of June.

There is a variety with fewer thorns, and one seed in a pod.

Genus 21. GUILANDINA. *Bonduc.* Class X. Decandria. Order I. Monogynia.

Species 1. *Hardy Bonduc,* or *Canada Nicker-tree.* (GUILANDINA DIOICA.)

The stem erect, thirty feet high or more, dividing into many branches, covered with a very smooth blueish ash-coloured bark. Leaflets oval, very smooth and entire, alternate. There are male and

female flowers on different plants.—Native of Canada, whence it was first brought to Paris. Cultivated in 1748, by Archibald Duke of Argyle.*

This sort will live abroad, and is never hurt by frost. The other species have propagated by seeds, but these require to be watered three or four days, to soften their outer coats, else they will remain years without vegetating. In general it is propagated by cutting away some of the horizontal roots, or by suckers. It requires a light soil.

Genus 22. JUGLANS. *Walnut.* Class XXI. Monoecia. Order VII. Polyandria.

Species 1. *Common Walnut Tree.* (JUGLANS REGIA.)

The Walnut is a very large and lofty tree, with strong spreading boughs. Leaves pinnate, with a very strong but not unpleasant smell. Leaflets three pairs, sometimes two or four, nearly equal, except that the odd one is larger, they are entire, smooth, and shining. Male flowers in close, pendulous, subterminating aments. Females scattered, frequently two or three together. Fruit an ovate, coriaceous, smooth drupe, inclosing an irregularly grooved nut, which contains a four-lobed, oily, palatable kernel, with an irregular knobbed surface, and covered with a yellow skin.

There are several varieties of the Common Walnut, which have been specified by Miller, but they all vary again when raised from the seed, and nuts from the same tree will produce different fruit: persons therefore who plant the Walnut for its fruit, should make choice of the trees in the nurseries, when they have their fruit upon them.

The flowers begin to open about the middle of April, and are in full blow by the middle of May, before which time the leaves are fully displayed. Even in the South of France it is frequently injured by spring frosts; to avoid this, it is a practice in Switzerland to engraft the common stocks with the late ripe variety, which does not produce its fruit before the month of May or June.† This might perhaps be too late for us, but in warmer climates, where the fruit is of much consequence for the oil which it yields, where the Olive will not succeed, it may be worth attending to. In France, Switzerland, &c. the wood is in great request for furniture, as it was formerly in England, till the use of Mahogany superseded it.

Were this timber, says Mr. Evelyn, in greater plenty amongst us, we should have far better utensils of all sorts for our houses, as chairs, stools, bedsteads, tables, wainscot, cabinets, &c. instead of the more vulgar Beech, subject to the worm, weak and unsightly; but which, to counterfeit and deceive the unwary, they wash over with a decoction made of the green husks of Walnuts, &c.

What universal use, he continues, the French make of the timber of this tree for domestic affairs, may be seen in every room both of poor and rich. It is of singular use with the joiner for the best grained and coloured wainscot; with the gunsmith for stocks; with the coachmaker for wheels and the bodies of coaches; the cabinet-maker uses it for inlayings, especially the firm and close timber about the root, which is admirable for flecked and cambleted works. To render this wood the better coloured joiners put the boards into an oven after the batch is forth, or lay them in a warm stable; and when they work it, polish it over with its own oil very hot, which makes it look black and sleek, and the older it is, the more estimable; but then it should not be put in work

* Hort. Kew. † Villars.

till thoroughly seasoned, because it will shrink beyond expectation. It is not only good to confide in it much for beams or joists, because of its brittleness.

Besides the uses of the wood, the fruit, when tender and very young, is used for preserves. It makes also food and oil: this last is of extraordinary use with the painter in whites and other delicate colours, also for gold size and varnish; and with this they polish walking-staves, and other works which are wrought in with burning. They fry with it in some places, and eat it in Berry instead of butter, of which they have little or none good; and therefore they plant infinite numbers of these trees all over that country: and the use of it to burn in lamps is common there.

The very husks and leaves being macerated in warm water, and that liquor poured on grass-walks and bowling-greens, infallibly kills the worms, without endangering the grass.* Not that there is any thing peculiarly noxious in this decoction, but worms cannot bear the application of any thing bitter to their bodies, which is the reason that bitters, such as Gentian, are the best destroyers of worms lodged in the bowels of animals. Worms are seldom observed in the intestines of the human body, excepting in cases where the bile is either weak or deficient.†

The dye made of this lixive will colour woods, hair and wool; and the green husks boiled, make a good colour to dye a dark yellow, without any mixture.

The younger timber is held to make the better-coloured work; but the older, being more firm and close, is finer cambleted for ornament. Those trees which are raised from the thick-shelled fruit become the best timber; but the thin-shelled yield better fruit.

Those nuts which come easily out of their husks should be laid to mellow in heaps, and the rest exposed in the sun till the shells dry, else the kernels will be apt to perish: some again preserve them in their own leaves, or in a chest made of walnut-tree wood; others in sand, especially for a seminary. Old nuts are not wholesome till macerated in warm water; but if you bury them in the earth in pots, out of the reach of the air, and so as no vermin can attack them, they will keep marvellously plump the whole year about, and may easily be blanched. In Spain, they strew the gratings of old and hard nuts, first peeled, into their tarts and other meats. For the oil, one bushel of nuts will yield fifteen pounds of peeled and clear kernels, and that half as much oil, which the sooner it is drawn, is the more in quantity, though the drier the nut, the better in quality: the lees or marc of the pressing is excellent to fatten hogs with. After the nuts are beaten down, the leaves should be sweeped into heaps, and carried away, because their extreme bitterness impairs the ground.‡

We are not certain of the native place of growth of the Walnut-tree. It is not an aboriginal of Europe, and there is little doubt but that it came into Italy from Greece, and into Greece from some part of Asia. Some authors take it for the *Nux Persica* of Theophrastus: Pliny (l. 15. c. 24.) says, it was brought from Persia by the kings; and on the authority of Lerche it is now set down as native of Persia in the later works of Linnæus. According to Loureiro, it is found wild in the northern provinces of China.

It is much cultivated in some parts of Italy, France, Germany, and Switzerland. Burgundy, says Mr. Evelyn, abounds with Walnut-trees, where they stand in the midst of goodly wheat lands, at sixty and a hundred feet distance, and so far are they from hurting the crop, that they are looked upon as great preservers by keeping the ground warm, nor do the roots hinder the plough. Whensever they fell a tree, which is only the old and decayed, they always plant a young one near him. In several places betwixt Hanau and Frankfort in Germany, no young farmer is permitted to marry

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* Sylva, 174, 175, 177, 178. ed Hunt. † Dr. Hunter's note, p. 178. ‡ Sylva, 178, 179.

a wife, till he bring proof that he has planted a stated number of Walnut-trees. The Bergstrass, which extends from Heidelberg to Darmstadt, is planted with Walnuts.* According to Pallas, it is common in Ukraine, the Chersonesus Taurica and Caucasus, where it also appears here and there in a wild state. From the northern side of Caucasus it becomes more scarce, but on the lower parts towards the south it is very common, large, and appears to be indigenous.

Formerly there were considerable plantations of this tree in England, particularly on the chalk hills of Surry. Mr. Evelyn instances those of Sir Richard Stidolph near Leatherhead; Sir Robert Clayton's at Morden near Godstone, once belonging to Sir John Evelyn; and about Carshalton, where many thousands of these trees celebrate the industry of the owners, and will certainly reward it with infinite improvement, besides the ornament which they afford to those pleasant tracts, for some miles in circumference.†

Little use having been made of the wood of late years for furniture, the old trees that have been cut down have not been always replaced with young ones, and thus the plantations of this tree have gradually diminished. The wood is now principally used for making gun-stocks; and the fruit with us is only for deserts, or green in pickles; so that the call for this tree is not equal to what it was formerly.

The English name of this tree and fruit has nothing to do with *wall:* it is *Gaul-nut*, whence we may conclude it came to us anciently from Gaul. The French call the tree *Noyer*, and the fruit *Noix*; as the Romans named it exclusively *Nux*.

Species 2. *White Walnut Tree.* (Juglans Alba.)

The leaves of the White Walnut-tree, or Hickery Nut, as it is called in North America, where it is very common in most of the provinces, are composed of two or three pairs of oblong lobes, terminated by an odd one; these are of a light green, and serrate; the lower pair of lobes are the smallest, and the upper the largest. The fruit is shaped like the common Walnut, but the shell is not furrowed, and is of a light colour.

Catesby says, it is usually a tall tree, and often grows to a large bulk, the body being from two to three feet diameter. The leaves differ from those of the common Walnut, not only in being serrated, but in being narrower and sharper pointed. In October, when the nuts are ripe, the outer shell opens and divides in quarters, disclosing the nut, the shell of which is thick, not easily broke but with a hammer. The kernel is sweet and well tasted; the Indians draw from it a wholesome and pleasant oil, and store up the nuts for winter provision. Hogs and many wild animals receive great benefit from them. The wood is coarse-grained, yet of much use for many things belonging to agriculture. Of the saplings or young trees are made the best hoops for tobacco, rice, and tar barrels. For the fire no wood in the northern parts of America is so much in request. The bark is deeply furrowed.

Cultivated in 1699 by the Duchess of Beaufort.‡

Species 3. *Black Walnut Tree.* (Juglans Nigra.)

The Black Virginia Walnut grows to a large size. The leaves are composed of five or six pairs of leaflets, which end in acute points and are serrate; the lower pair is the least, the others gradually

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* Sylva, 174, 175. † Ibid. 176. ‡ Hort. Kew.

increase, but the pair at top and the terminating leaflet are smaller: these leaves when bruised emit a strong aromatic flavour, as does also the outer cover of the nuts, which is rough, and rounder than that of the Common Walnut. The shell is very hard and thick, and the kernel small. Catesby says, that it is very oily and rank tasted; when laid by however for some months it is eaten by Indians, squirrels, &c. He remarks, that the leaves are much narrower, as well as sharp pointed, than those of our Walnut, and not so smooth; that the thickness of the inner shell requires a hammer to break it; and that it seems to have taken its name from the colour of the wood, which approaches nearer to black than any other wood that affords so large timber, and therefore is esteemed for making cabinets, &c.

Mr. Miller says that is the most valuable wood of all the sorts of Walnut, and that some of the trees are beautifully veined, and will take a good polish; that others however have very little beauty. He adds, that this is full as hardy as our common sort, and that there are some large trees of it in the Chelsea garden, which have produced great quantities of fruit upwards of forty years,* which have generally ripened so well as to grow; but the kernels being small, they are of little value on that account. It was cultivated in 1656, by Mr. John Tradescant, junior.†

Species 4. *Oblong-fruited Walnut Tree.* (Juglans Oblonga.)

Nut oblong, acuminate, the colour of the common Walnut. It was raised from nuts brought from America by Kalm, and first bore fruit in 1774. It was supposed to be the J. nigra, but the colour and form of the fruit are different, and the leaves have no smell.‡

Species 5. *Ash-coloured Walnut Tree.* (Juglans Cinera.)

This grows to a large size. The leaves have seven or eight pairs of long heart-shaped leaflets, broad at their base, where they are divided into two round ears, but terminate in acute points; they are rougher and of a deeper green than those of the Black Walnut, and have nothing of the aromatic scent which they have. The fruit is very long; the shell deeply furrowed and very hard; the kernel small but well flavoured.

Native of North America. Cultivated in 1686, by Mr. John Tradescant, junior.§ The order of flowering, according to Jacquin, is, first *J. regia*, then *cinerea*, and lastly *nigra* in a few days after. The order of fruiting is different, for when the fruit of the common Walnut begins to drop on the eighth of September, the *nigra* follows at the end of the same month, and the *cinerea* not till after the beginning of October.

Species 6. *Flat-fruited Walnut Tree.* (Juglans Compressa.)

This tree is of a middling stature. The leaves have three pairs of leaflets, of a dark green colour, ending in acute points. The fruit is oval; the shell white, hard and smooth; the kernel small, but very sweet. The young shoots are covered with a very smooth brownish bark, but the stems and older branches have a rough scaly bark, whence it has the appellation of *Shagbark* in America.

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* He says this in 1759.
† Hort. Kew.
‡ Retzius.
§ Hort. Kew.

Species 7. *Narrow-leaved Walnut Tree.* (JUGLANS ANGUSTIFOLIA.)

Native of North America. Introduced in 1766 by Messrs. Kennedy and Lee.

CULTURE.

The common Walnut is propagated in many parts of England for the fruit, and formerly the trees were propagated for their wood, which was in very great esteem, till the quantity of Mahogany, and other useful woods which have been of late years imported into England, almost banished the use of Walnut.

These trees are propagated by planting their nuts, which, as was before observed, seldom produce the same sort of fruit as are sown; so that the only way to have the desired sort, is to sow the nuts of the best kinds; and if this is done in a nursery, the trees should be transplanted out when they have had three or four years growth, to the place where they are designed to remain; for these trees do not bear transplanting when they are of a large size, therefore there may be a good number of the trees planted, which need not be put more than six feet apart, which will be distance enough for them to grow till they produce fruit; when those whose fruit are of the desired kind may remain, and the others cut up, to allow them room to grow, by this method a sufficient number of the trees may be generally found among them to remain, which will thrive and flourish greatly when they have room; but as many people do not care to wait so long for the fruit, so the next best method is to make choice of some young trees in the nurseries, when they have their fruit upon them; but though these trees will grow and bear fruit, yet they will never be so large or so long lived, as those which are planted young.

All the sorts of Walnuts which are propagated for timber, should be sown in the places where they are to remain; for the roots of these trees always incline downward, which being stopped or broken, prevent their aspiring upward, so that they afterwards divaricate into branches, and become low spreading trees; but such as are propagated for fruit are greatly mended by transplanting; for hereby they are rendered more fruitful, and their fruit are generally larger and fairer; it being a common observation, that downright roots greatly encourage the luxuriant growth of timber in all sorts of trees; but such trees as have their roots spreading near the surface of the ground, are always the most fruitful and best flavoured.

The nuts should be preserved in their outer covers in dry sand until February, when they should be planted in lines, at the distance you intend them to remain; but in the rows they may be placed pretty close, for fear the nuts should miscarry; and the young trees, where they are too thick, may be removed, after they have grown two or three years, leaving the remainder at the distance they are to stand.

In transplanting these trees, you should observe never to procure either their roots or large branches, both which are very injurious to them; nor should you be too busy in lopping or pruning the branches of these trees when grown to a large size, for it often causes them to decay: but when there is a necessity for cutting any of their branches off, it should be done early in September (for at that season the trees are not so subject to bleed) that the wound may heal over before the cold increases; the branches should always be cut off quite close to the trunk, otherwise the stump which is left will decay, and rot the body of the tree.

The best season for transplanting these trees is as soon as the leaves begin to decay, at which time, if they are carefully taken up, and their branches preserved entire, there will be little danger of their succeeding although they are eight or ten years old, as I have several times experienced:

though, as was before observed, these trees will not grow so large, or continue so long, as those which are removed young.

This tree delights in a firm, rich, loamy soil, or such as is inclinable to chalk or marl; and will thrive very well in stony ground, and on chalky hills, as may be seen by those large plantations near Leatherhead, Godstone, and Carshalton in Surry, where are great numbers of those trees planted upon the downs, which annually produce large quantities of fruit, to the great advantage of their owners.

The distance these trees should be placed, ought not to be less than forty feet, especially if regard be had to their fruit; though when they are only designed for timber, if they stand much nearer, it promotes their upright growth. The black Virginia Walnut is much more inclinable to grow upright than the common sort, and the wood being generally of a more beautiful grain, renders it preferable to that, and better worth cultivating. I have seen some of this wood which has been beautifully veined with black and white, which, when polished, has appeared, at a distance, like veined marble. This wood is greatly esteemed by the cabinet-makers for inlaying, as also for bedsteads, stools, chairs, tables, and cabinets; and is one of the most durable woods for those purposes of English growth, being less liable to be infected with insects than most other kinds (which may proceed from its extraordinary bitterness); but it is not proper for buildings of strength, it being of a brittle nature, and exceeding subject to break very short.

The general opinion is, that the beating off this fruit improves the trees, which I do not believe, since in the doing this, the younger branches are generally broken and destroyed; but as it would be exceeding troublesome to gather it by hand, so in beating it off, great care should be taken that it be not done with great violence, for the reason before assigned. In order to preserve the fruit, it should remain upon the trees till it is thorough ripe, when it should be beaten down, and laid in heaps for two or three days; after which it should be spread abroad, when, in a little time, the husks will easily part from the shells; then you must dry them well in the sun, and lay them up in a dry place, where mice or other vermin cannot come to them, in which place they will remain good for four or five months; but there are some persons who put their Walnuts into an oven gently heated, where they let them remain four or five hours to dry, and then put them up in oil jars, or any other close vessel, mixing them with dry sand, by which method they will keep good six months. The putting them in the oven is to dry the germ, and prevent their sprouting; but if the oven be too hot it will cause them to shrink.

All the other sorts are propagated in the same way, but as few of the sorts produce fruit in England, their nuts must be procured from North America; they should be gathered when fully ripe, and put up in dry sand, to preserve them in their passage to England: when they arrive here, the sooner they are planted the greater chance there will be of their succeeding; when the plants come up, keep them clean from weeds; and if they shoot late in the autumn, and their tops are full of sap, cover them with mats, or other light covering, to prevent the early frosts from pinching their tender shoots, which often causes them to die down a considerable length before the spring; but if they are screened from these early frosts, the shoots will become firmer and better able to resist the cold. Some of the sorts being tender whilst young, require a little care for the two first winters, but afterwards will be hardy enough to resist the greatest cold of this country. The black Virginia Walnut is full as hardy as the common sort. They all require the same culture as the common Walnut; but grow best in a soft loamy soil, not too dry; and where there is a depth of soil for their roots to run down. The Hickery, when young, is very tough and pliable, sticks of it therefore are much esteemed; but the wood, when large, being very brittle, is not of any great use. The black Virginia Walnut is the most valuable.

In setting the nuts, Dr. Hunter recommends drills to be made at one foot asunder, and two inches and a half deep, into which put the nuts four inches apart. Mr. Evelyn advises some furze to be chopped among them, to preserve them from vermin.

The size to which the Walnut will attain may be judged of from what Scamozzi the architect says, as Mr. Evelyn reports; that he saw a table of Walnut tree in Lorrain, all of one piece, which was twenty-five feet in breadth, of competent length and thickness.

Genus 23. LAURUS. *Laurel.* Class X. Enneandria. Order I. Monogynia.

Species 1. *Benjamin Tree.* (LAURUS BENZOIN.)

This rises to the height of ten or twelve feet, dividing into many branches. Leaves near three inches long, and an inch and half broad, smooth on their upper surface, but with many transverse veins on their under side. Flowers of a white herbaceous colour, with six stamina in each.

Native of Virginia; whence it was sent by Banister to Compton Bishop of London, and cultivated in his garden at Fulham in 1688, by Mr. George London.*

This tree has been confounded with the true Benzoin tree, *Styrax Benzoin.*

Species 2. *Sassafras Tree.* (LAURUS SASSAFRAS.)

The Sassafras tree is commonly rather a shrub, seldom rising more than eight or ten feet high. The leaves are of different shapes and sizes; some oval and entire, about four inches long and three broad; others are deeply divided into three lobes; these are six inches long, and as much in breadth from the extremity of the two outside lobes; they are placed alternately on pretty long foot-stalks, and are of a lucid green; they fall off early in the autumn, and in the spring, soon after the leaves begin to come out, the flowers appear just below them, on slender peduncles, each sustaining three or four small, yellowish flowers, which have five oval, concave petals, and eight stamina in the male flowers, which are upon different plants from the bisexual flowers. These are succeeded by an oval berry, which, when ripe, is blue.

Catesby describes the Sassafras as a small tree, the trunk usually not a foot thick. The leaves divided into three lobes by very deep incisures. In March bunches of small five-petalled flowers coming forth, succeeded by berries, in size and shape not unlike those of the Bay-tree, hanging on red foot-stalks, with a red calyx, resembling that of an acorn: they are at first green, and when ripe blue.

This tree is described at full length in the second volume of Nova Acta Nat. Cur. by Trew, who has there given an ample account of its Natural History.

The wood of this tree, which is of a light and spongy texture, has a fragrant smell, and a sweetish aromatic taste, and with the bark, is much used in the Materia Medica. It gives out its virtues both to spirit and water, but most readily to the former.†

Native of almost all America, commonly in a sandy soil, never in swamps. It was also observed by Loureiro in the north of Cochinchina near Tonquin. It has withstood the cold of several winters

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* Raii Hist. and Hort. Kew.

† For its employment in Medicine, vide our History of the Medical Virtues of Plants.

at Mr. Collinson's at Peckham, Mr. Bacon's at Hoxton, Mr. Gray's at Fulham, Mr. Gordon's at Mile-end, &c. &c. and was cultivated before 1633, by Mr. Wilmot, at Bow.*

A decoction of Sassafras with sugar was sold in coffee-houses at the end of the last century, under the name of *Bochet*.† There was a shop in Fleet-street for the sale of it within these few years, and perhaps others. The bark has been substituted in America for spice. It is said that bedsteads made of the wood will never be infested with bugs.‡ Loureiro remarks, that it is very proper for making cabinets in hot climates, on the same account, because the smell repels insects. There are however some doubts whether the Cochinchinese Sassafras be the same with the American.

CULTURE.

The Sassafras-tree is commonly propagated by the berries, which are brought from America; but these berries generally lie in the ground a whole year, and sometimes two or three years before they grow, when they are sown in the spring; therefore the surest method of obtaining the plants will be, to get the berries put into a tub of earth soon after they are ripe, and sent over in the earth; and as soon as they arrive, to sow the berries on a bed of light ground, putting them two inches in the earth; and if the spring should prove dry, the bed must be frequently watered, and shaded from the great heat of the sun in the middle of the day; with this management many of the plants will come up the first season, but as a great many of the berries will lie in the ground till the next spring, so the bed should not be disturbed, but wait until the season after, to see what will come up. The first winter after the plants come up, they should be protected from the frost, especially in the autumn; for the first early frost in that season is apt to pinch the shoots of these plants, which, when young, are tender and full of sap, so will do them more injury than the severe frost of the winter; for when the extreme part of the shoots are killed, it greatly affects the whole plant.

When the plants have grown a year in the seed-bed, they may be transplanted into the places where they are to remain for good.

There have been some of these plants propagated by layers, but these are commonly two, and sometimes three years before they put out roots; and if they are not duly watered in dry weather, they rarely take root; so that it is uncertain whether one in three of these layers succeed, which renders these plants scarce in England.

The Benjamin-tree also, as it is falsely called, may be propagated by sowing the berries. They generally lie long in the ground, so that unless they are brought over in earth, they often fail. But this may likewise be increased by layers, which put out roots freely, when the young shoots are made choice of.

Genus 24. LIQUIDAMBAR. *Sweet Gum.* Class XXI. Monœcia. Order VII. Polyandria.

Species 1. *Maple-leaved Liquidamber, or Sweet Gum.* (LIQUIDAMBAR STYRACIFLUA.)

The trunk of the Sweet-Gum tree is commonly two feet in diameter, straight, and free from branches to the height of about fifteen feet; from which the branches spread and rise in a conic

* Hort. Kew. from Ger. Emac.
† Houghton's Collections, 3. 65.
‡ Cutler in Med. Acad. Amer. Vol. I.

form to the height of forty feet and upwards from the ground. Leaves five-pointed, divided into so many deep sections, (or sometimes seven) and set on long slender petioles. In February before the leaves are formed, the blossoms begin to break forth from the tops of the branches into spikes of yellowish-red, pappose, globular flowers, which swell gradually, retaining their round form, to the full maturity of their seed-vessels, which are thick set with pointed hollow protuberances, and splitting open discharge their seeds. Each cell contains a seed, winged at one end with many small grains distinct from the seed.* These, which Linnæus calls chaffy corpuscules, according to Gertner, are immature germs. There are two capsules in each cell of the ament; they are grooved, shining, and of a bay ferruginous colour. Common receptacle globular, honey-combed, with the female bell-shaped calyxes united, proper none, besides the inner walls of the capsules, to which the germs are fixed all round. Seeds as many as sixteen in a capsule, oblong elliptic, compressed like a lens.†

The leaves are shaped somewhat like those of the lesser Maple, but are of a dark green colour, with their upper surfaces shining. A sweet glutinous substance exsudes through their pores in warm weather, which renders them clammy to the touch.

The leaves of this species are distinguished from those of the second by the little tufts of hairs placed where the veins divide from the midrib.

The wood of this tree is good timber, and is used in wainscotting, &c. The grain is fine, and some of it beautifully variegated; but when wrought too green is apt to shrink, to prevent which no less than eight or ten years is sufficient to season the planks. From between the wood and the bark issues a fragrant gum, which trickles from the wounded trees, and by the heat of the sun congeals into transparent drops, which the Indians chew, as a preservative to their teeth. It smells so like Balsam of Tolu, that it is not easy to distinguish them. The Bark is also of singular use to the Indians for covering their huts.‡

Native of North America, in low chavey ground. Cultivated in the garden of Compton, Bishop of London, in 1688, by his gardener George London. It was sent over from Virginia by Banister.§

Species 2. *Oriental Liquidamber.* (Liquidambar Imberbe.)

The leaves of this have their lobes shorter, and much more situated on their borders, they end in blunt points, and are not serrated. They have also none of those tufts of hair which are found on the leaves of the first sort. Its native country is unknown. According to Mr. Miller, the seeds were sent to Mr. Peyssonel from the Levant, to the King of France's garden at Marli. Mons. Richard, the King's gardener, sent some of them to Mr. Miller, who cultivated this tree in 1759.‖

CULTURE.

The Sweet-Gum tree is hardy enough to endure the severest cold of this country in the open air. It is commonly propagated by layers; but when raised from seeds, it grows to be a much finer tree.

The seeds of this tree, if sown in the spring, commonly remain in the ground a whole year before the plants come up; so that the surest way to raise them is, to sow the seeds in boxes or pots of light earth; which may be placed in a shady situation during the first summer, and in

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* Catesby. † Gærtner. ‡ Catesby.
§ Ray Hist. 1681. ‖ Hort. Kew.

autumn they may be removed where they may have more sun; but if the winter should prove severe, it will be proper to cover them with Pease-haulm, or other light covering, which should be taken off constantly in mild weather. In the following spring, if these boxes or pots are placed upon a moderate hot-bed, it will cause the seeds to come up early, so that the plants will have time to get strength before the winter; but during the first and second winters, it will be proper to screen the plants from severe frost, but afterwards they will bear the cold very well.

Genus 25. Liriodendrum. *Tulip Tree.* Class VII. Polyandria. Order VII. Polygynia.

Species 1. *Common Tulip-tree.* (Liriodendron Tulipifera.)

This is a native of North America, where it grows so large as to be a tree of the first magnitude, and is generally known through all the English settlements by the title of Poplar. Of late years there have been great numbers of these trees raised from seeds in the English gardens, so that now they are become common in the nurseries about London, and there are many of the trees in several parts of England which do annually produce flowers. The first tree of this kind which flowered here, was in the gardens of the late Earl of Peterborough, at Parsons Green near Fulham, which was planted in a wilderness among other trees; before this was planted in the open air, the few plants which were then in the English gardens, were planted in pots and housed in winter, supposing they were too tender to live in the open air; but this tree soon after it was placed in the full ground, convinced the gardeners of their mistake, by the great progress it made, while those which were kept in pots and tubs increased slowly in their growth: so that afterward there were many others planted in the open ground, which are now arrived to a large size, especially those which were planted in a moist soil. One of the handsomest trees of this kind near London, is in the garden of Mr. Jones at Waltham Abbey; and at Wilton, the seat of the Earl of Pembroke, there are some trees of great bulk; but the old tree at Parsons Green is quite destroyed, by the other trees which were suffered to overhang it, and rob it of its nourishment, from a fear of taking down the neighbouring trees, lest by admitting the cold air to the Tulip-tree it would injure it.

Mr. Darby at Hoxton and Mr. Fairchild seem to have been the first who raised this tree in any quantity from seeds, and from them the gardens abroad were chiefly supplied.* Bishop Compton, however, cultivated it at Fulham in 1688.† There is a fine tree in Mr. Ord's garden at Walham Green, every year covered with blossoms.‡

The young shoots of this tree are covered with a smooth purplish bark; they are garnished with large leaves, whose foot-stalks are four inches long; they are ranged alternate; the leaves are of a singular form, being divided into three lobes; the middle lobe is blunt and hollowed at the point, appearing as if it had been cut with scissars. The two side lobes are rounded, and end in blunt points. The leaves are from four to five inches broad near their base, and about four inches long from the foot-stalk to the point, having a strong midrib, which is formed by the prolongation of the foot-stalk. From the midrib run many transverse veins to the borders, which ramify into several smaller. The upper surface of the leaves is smooth, and of a lucid green, the under is of a pale green. The flowers are produced at the end of the branches; they are composed of six petals,

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* Miller's Dict. edit. 1724. 8vo.

† Hort. Kew. from Ray Hist.

‡ Curt. Magaz.

three without, and three within, which form a sort of bell-shaped flower, whence the inhabitants of North America gave it the title of Tulip. These petals are marked with green, yellow, and red spots, making a fine appearance when the trees are well charged with flowers. The time of this tree's flowering is in July, and when the flowers drop, the germ swells, and forms a kind of cone, but these do not ripen in England.

Mr. Catesby, in his Natural History of Carolina, &c. says, there are some of these trees in America, which are thirty feet in circumference; that the boughs are unequal and irregular, making several bends or elbows, which render the trees distinguishable at a great distance, even when they have no leaves upon them. They are found in most parts of the northern continent of America, from the Cape of Florida to New England, where the timber is of great use, particularly for making of periaugues, the trunks of these being large enough to be hollowed into the shape of those boats, so they are of one piece.

Mr. Marshall describes the Tulip tree as seventy or eighty feet in height. He mentions two varieties, one with yellow, and the other with white wood; the first soft and brittle, much used for boards and heels of shoes, also turned into bowls, trenchers, &c.; the white heavy, tough and hard, sawed into joists, boards, &c. for building. He remarks that the flower has sometimes seven petals or more.

Kalm observes, that it is very agreeable at the end of May to see one of these large trees, with its singular leaves, and covered for a fortnight together with flowers, which have the shape, size, and partly the colour of Tulips. The wood is used for canoes, whence the Swedes in North America call it Canoe-tree, for boards, bowls, dishes, spoons, and all sorts of joiners' work. Kalm speaks of having seen a barn of considerable size, the sides and roof of which were made of a single Tulip-tree split into boards. But there is one inconvenience attending it, for there is no wood that contracts and expands itself so much as this. The bark is divisible into very thin laminæ, which are tough like bast. It is pounded, and given to horses who have the bots. The roots are supposed to be as efficacious in agues as Jesuit's bark.

CULTURE.

This tree is propagated by seeds, which are now annually imported in great plenty from America. These may be either sown in pots or tubs filled with light earth from the kitchen garden, or in a bed in the full ground. Those which are sown in the first way, may be placed on a gentle hot-bed, which will forward their growth, so that the plants will acquire more strength before winter. If they are thus treated, the glasses of the hot-bed should be shaded from the sun every day, and the earth in the pots should be frequently refreshed with water, for unless it is kept moist, the seeds will not grow; but this must be done with care, so as not to make it too wet, which will rot the seeds. When the plants appear, they must be still shaded in the heat of the day from the sun, but fresh air must be admitted daily to prevent their drawing up weak, and as the season advances, they must be gradually hardened to bear the open air. While the plants are young, they do not care for much sun, so they should be either shaded or placed where the morning sun only shines upon them; they must also be constantly supplied with water, but not have it in too great plenty. As the young plants commonly continue growing late in the summer, so when there happens early frosts in autumn, it often kills their tender tops, which occasions their dying down a considerable length in winter; therefore they should be carefully guarded against these first frosts, which are always more hurtful to them than harder frosts afterwards, when their shoots are better hardened; however, the first winter after the plants come up, it will be the better way to shelter

them in a common hot-bed frame, or to arch them over with hoops, and cover them with mats, exposing them always to the open air in mild weather.

The following spring, just before the plants begin to shoot, they should be transplanted into nursery-beds, in a sheltered situation, where they are not too much exposed to the sun. The soil of these beds should be a soft gentle loam, not too stiff, nor over light; this should be well wrought, and the clods well broken, and made fine. There must be great care not to break the roots of the plants in taking them up, for they are very tender; they should be planted again as soon as possible, for if their roots are long out of the ground, they will be much injured thereby. These may be planted in rows at about a foot distance, and at six inches distance in the rows, for as they should not remain long in these nursery-beds, so this will be room enough for them to grow; and by having them so close, they may be shaded in the summer, or sheltered in the winter, with more ease than when they are farther apart.

When the plants are thus planted, if the surface of the beds is covered with rotten tanners' bark, or with moss, it will prevent the earth from drying too fast, so that the plants will not require to be so often watered, as they must be where the ground is exposed to the sun and air; after this, the farther care will be to keep them clear from weeds, and if the latter part of summer should prove moist, it will occasion the plants growing late in autumn, so the tops will be tender, and liable to be killed in the first frosts. In this case, they sould be covered with mats to protect them.

If the plants make great progress the first summer, they they may be transplanted again the following spring; part of them may be planted in the places where they are to remain, and the other should be planted in a nursery where they may grow two or three years to acquire strength before they are planted out for good; though the younger they are planted in the places where they are to stand, the larger they will grow, for the roots run out into length, and when they are cut it greatly retards its growth, so that these trees should never be removed large, for they rarely succeed when they are grown to a large size before they are transplanted. Some trees I have seen removed pretty large, which have survived their removal, but young plants of two or three years old which were planted near them, were much larger in fifteen years than the old ones.

When the seeds are sown upon a bed in the full ground, the bed should be arched over with hoops, and shaded in the heat of the day from the sun, and frequently refreshed with water; as also should the plants when they appear, for when they are exposed much to the sun they make but small progress. The care of these in summer must be to keep them clean from weeds, supplying them duly with water, and shading them from the sun in hot weather; but as these seeds will not come up so soon as those which were placed in a hot-bed, they generally continue growing later in autumn, therefore will require shelter from the early frosts in autumn; for as the shoots of these will be much softer than those of the plants which had longer time to grow, so if the autumnal frosts should prove severe, they will be in danger of being killed down to the surface of the ground, by which the whole summer's growth will be lost, and sometimes the plants are entirely killed by the frost the first winter, if they are not protected.

As these plants will not have advanced so much in their growth as the other, they should remain in the seed-bed to have another year's growth before they are removed, therefore all that will be necessary to observe the second year is to keep them clean from weeds; and now they will not be in so much danger of suffering from the warmth of the sun as before, therefore will not require such constant care to shade them; nor should the watering of them be continued longer than the spring, for if the autumn should prove dry, it will prevent the plants from shooting late, and harden those shoots which were made early in the year, whereby the plants will be in less danger from the early frosts.

After the plants have grown two years in the seed-bed, they will be strong enough to remove; therefore, in the spring, just at the time when their buds begin to swell, they should be carefully taken up, and transplanted into nursery-beds, and in the same way as those which were raised on a hot-bed.

There are some people who propagate this tree by layers, but the layers are commonly two or three years before they take root, and the plants so raised, seldom make such straight trees as those raised from seeds; though indeed they will produce flowers sooner, as is always the case with stunted plants.

This tree should be planted on a light loamy soil, not too dry, on which it will thrive much better than upon a strong clay, or a dry gravelly ground: for in America they are chiefly found upon a moist light soil, where they will grow to a prodigious size, though it will not be proper to plant trees in a soil which is too moist in England, because it might endanger the rotting of the fibres of the roots by the moisture continuing too long about them, especially if the bottom be clay, or a strong loam, which will detain the wet.

To raise them in the open ground the beginning of March, prepare a bed of good mellow rich earth well mixed with old rotten cow-dung, exposed to the sun, and sheltered from cold winds; place an old frame over the bed, and having sown the seeds, sift over them, half an inch thick, a soil composed some months before of one load of old pasture earth, one of well rotted cow-dung, and half a load of sea or fine pit sand. Some of these seeds will probably make their appearance in nine or ten weeks, but much the greater part will lie in the ground till next spring. Water the beds therefore no more than barely sufficient to cherish the plants that have appeared: for four or five weeks screen them from the sun during the heat of the day, but afterwards let them receive its full influence. In bad weather, during winter, throw double mats over the frames.

In March the succeeding year, pick off all mossy, hard crusted earth from the bed, smooth it, and sift on some fine, rich mould. The end of April, or beginning of May, plants will appear in abundance, when they must be frequently but gently watered. Till the beginning of August they must be screened from the mid-day sun, by part of an old reed-fence, or by nailing some thin boards together high enough to shade the bed. After this, no farther care is necessary, but frequent moderate waterings, and to throw a mat over the frame during any severe winter storm.

The beginning of April, next season, take up the plants carefully with a trowel, without bruising the roots, and if they cannot be planted immediately, mix a pailful of sifted mould and water, to the consistence of pap; draw the plants through it, till as much adhere as covers their roots and fibres; in this condition they may be kept several days out of the ground. Cut only a little of the tap-root smoothly off, but let all the fibres remain; and then plant them in drills cut out with the spade, at a foot distance row from row, and six inches in the row. Plant five of these lines, and then leave an alley three feet wide. Water them frequently and plentifully during the summer months; throw mats over them in case of very severe frost, the first winter, and let them remain two years. Then remove them to another nursery, in rows three feet and a half distant, and eighteen inches in the row, and let them continue three years. Being now six or seven feet high, they will be of a good size for planting where they are to remain. No tree bears pruning its roots or branches worse than this.

It is a tree of extraordinary beauty and stateliness, and highly deserves a place in all noble and elegant plantations.*

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* Boutcher.

Genus 26. Magnolia. *Magnolia.* Class XIII. Polyandria. Order VII. Polygynia.

Species 1. *Swamp Magnolia.* (Magnolia Glauca.)

The Swamp Magnolia usually grows about fifteen or sixteen feet high, with a slender stem, covered with a smooth whitish bark. The wood is white and spongy. Leaves thick and smooth, resembling those of the Bay, entire, dark green on their upper surface, but whitish or glaucous, and a little hairy underneath. The flowers are produced in May or June at the extremity of the branches: they are white, and have an agreeable sweet scent; and have only six concave petals. After these are past the fruit increases to the size of a Walnut with its cover, an inch or more in length, and three fourths of an inch in diameter, of a conical shape: the seed is about the size of a kidney-bean. This fruit is at first green, afterwards red, and when ripe, of a brown colour. In North America, where it grows naturally in low moist or swampy ground, there is a succession of flowers on the trees for two months or more: but in England there are seldom more than twelve or fourteen flowers on a tree, and those of short duration.

The young plants frequently retain their leaves through the greatest part of winter, and often do not fall, till the young shoots thrust them off: but when they are three or four years old, they constantly cast their leaves by the beginning of November.

In the Kew catalogue however the *deciduous* is distinguished from the *evergreen* Swamp Magnolia.

The greatest number of these trees, which are now growing in England, are at his Grace the Duke of Norfolk's, at Worksop Manor, in Nottinghamshire.

It was cultivated in 1688, being inserted by Ray in his catalogue of rare exotic trees and shrubs cultivated in the episcopal garden at Fulham, by bishop Compton, to whom it was sent by Banister.*

In America this tree is known by the name of *White Laurel, Swamp Sassafras,* and *Beaver Tree.* It has the last name, because the root is eaten as a great dainty by Beavers; and this animal is caught by means of it. Kalm says that this tree drops its leaves early in autumn, though some of the young trees keep them all the winter. This corresponds with what Mr. Miller affirms, as stated above. Kalm also reports, that he has seldom found the Beaver tree to the north of Pensylvania, where it begins to flower at the end of May. These trees may then be discovered by the scent of the blossoms at the distance of three quarters of a mile, if the wind be favourable. It is beyond description pleasant to travel in the woods at that season, especially in the evening. They retain their flowers for three weeks, and even longer. The berries also look very handsome, when they are ripe, being of a rich red colour, and hanging in bunches on slender threads.

Species 2. *Blue Magnolia.* (Magnolia Acuminata.)

This tree grows sometimes to the height of thirty or forty feet, and the trunk is eighteen inches or more in diameter. Leaves near eight inches long, and five broad. The flowers come out early in the spring, are composed of twelve large blueish-coloured petals. The fruit is about three

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* Hist. p. 1798.

inches long, somewhat resembling a small Cucumber, whence the inhabitants of North America call it Cucumber Tree.* The wood is of a fine grain, and an orange colour. It is not very common in any of the inhabited parts of America. Some of the trees were discovered by Mr. John Bartram, growing on the north branch of Susquehanna river. It was introduced in 1736, by Mr. Peter Collinson.†

Species 3. *Umbrella Magnolia.* (MAGNOLIA TRIPETALA.)

The Umbrella tree usually grows from sixteen to twenty feet high, with a slender trunk, covered with a smooth bark, and dividing into several branches. The leaves are remarkably large, often from twelve to fifteen inches or more in length, and five or six in width, narrowing to a point at each extremity, placed at the ends of the branches in a circular manner, somewhat like an Umbrella, whence its name. The flowers are composed of ten, eleven or twelve large, oblong, white petals; the outer ones hanging down. Seed-vessels oblong, conical, between three and four inches in length, and about an inch and a half in diameter.‡

The wood is soft and spongy; and the leaves drop off at the beginning of Winter.

This is pretty frequent in Carolina. It is also found in Virginia, and some parts of Pensylvania. It was cultivated here in 1752, according to Miller.§

CULTURE.

The Magnolias are propagated by seeds, procured from the places of their natural growth: these should be put in sand, and sent over as soon as possible; for if they are kept long out of the ground, they rarely grow, and therefore should be sown soon after they arrive. It is a good way to sow them in pots, and plunge them into an old hot-bed of tanner's bark.

They may also be raised from layers and cuttings; but these do not thrive so well as those which come from seeds, nor will they grow to near their size.

The first sort is not so difficult to train up as the third, but in order to get the plants forward, it will be proper when they are removed out of the seed-pots, to plant them each into a separate small pot, filled with soft loamy earth, and plunge them into a gentle hot-bed of tanner's bark, observing to shade them from the sun, and admit proper air to them: but at midsummer, if they are well rooted, inure them to the open air gradually, and place them in a sheltered situation, where they may remain till autumn; but on the first approach of frost remove them under shelter. When the plants have got strength, some of them may be turned out of the pots, and planted in the full ground in a warm sheltered situation; but part should be kept in pots, and sheltered in the winter, lest those in the open air should be killed.

If the plants make good progress, they will be strong enough to plant in the full ground in about six or seven years from seeds. Remove or shift them in March, before they begin to shoot: which may sometimes happen to be too soon to turn them out of the pots into the full ground; but as there will be no danger in removing them out of the pots, the ball of earth being preserved to their roots, it is best to defer this till the month of April: but it will be necessary to harden those plants which are intended to be planted out, by exposing them to the air as much as possible before, which will keep the plants back, and prevent their shooting: for if they make shoots in the green-

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* Marshall. † Hort. Kew. ‡ Marshall. § Hort. Kew.

house, they will be too tender to bear the sun, until they are by degrees hardened to it, and the frosts which frequently happen very late in the spring will greatly pinch them.

Two or three winters after they are planted out, it will be necessary to lay some mulch on the surface of the ground about their roots, also to throw some mats over their heads, especially at the beginning of the morning frosts in autumn: but in doing this, the heads of the plant should never be too closely covered up, lest the shoots should grow mouldy, which will be as injurious to them as the frost. As the plants get strength, they will be better able to endure the cold of our climate; though it will be proper to lay some mulch about their roots every winter, and in very severe frost to cover their heads and stems. This is best done by erecting an occasional frame of poles, whereon the mats may be thrown, which by being at a distance from the plant, will not confine it, or bruise the tender shoots; and they may be put aside in the day time towards the sun, or from the wind.

Genus 27. Nyssa, Tupelo. Class XXIII. Polygamia. Order II. Dioecia.

Species 1. *Mountain Tupelo.* (Nyssa Integrifolia.)

The upland Tupelo-Tree or Sour Gum grows naturally in Pennsylvania and perhaps elsewhere, rising with a strong upright trunk to the height of thirty or forty feet, and sometimes near two feet in diameter; sending off many horizontal, and often depending branches. Leaves obovate, a little pointed, entire, of a dark green and shining upper surface, but lighter and a little hairy underneath: those of male trees are often narrower and some lance-shaped. The flowers are produced upon pretty long common footstalks, arising from the base of the young shoots, and dividing irregularly into several parts, generally from six to ten; each supporting a small flower, having a calyx of six or seven unequal leaves, and from six to eight awl-shaped spreading stamens, supporting short four-lobed anthers. The female trees have fewer flowers produced upon much longer simple cylindrical footstalks, thickened at the extremity, and supporting generally three flowers, sitting close and having a small involucre. They are composed of five small oval leaves, and in the center an awl-shaped incurved style, arising from the oblong germen, which is inferior, and becomes an oval oblong berry, of a dark purplish colour when ripe. The timber of this tree is close grained and curled so as not to be slit or parted; and therefore much used for hubs of wheels of carriages, &c.*

It was cultivated in 1750, by Archibald Duke of Argyle.†

Mr. Miller has the Nyssa aquatica, probably this species, in the two quarto editions of his Dictionary, 1763, and 1771, but not in the two folio editions of 1759 and 1768. His description is very imperfect. He says that it grows naturally in Virginia and several other parts of North America, and that it had been of late years introduced into the English gardens, but had made little progress.

Species 2. *Water Tupelo.* (Nyssa Denticulata.)

The Virginian Water Tupelo-Tree grows naturally in wet swamps, or near large rivers in Carolina and Florida; and rises with a strong upright trunk to the height of eighty or an hundred feet, dividing into many branches towards the top. The leaves are pretty large, of an oval spear-shaped

* Marshall. † Hort. Kew.

form, generally entire, but sometimes somewhat toothed, and covered underneath with a whitish down: they are joined to long slender footstalks, and affixed to the branches in somewhat of a verticillate order, presenting a beautiful varied foliage. The berries are near the size and shape of small olives, and are preserved as that fruit is by the French inhabitants upon the Missisippi, where it greatly abounds, and is called the Olive-tree. The timber is white and soft when unseasoned, but light and compact when dry, which renders it very proper for making trays, bowls, &c.*

It was introduced here in 1735, by Peter Collinson, Esq.†

Mr. Humphrey Marshall, in his American Grove, quoted above, adds a third sort, from Bartram's catalogue, which he calls Nyssa Ogeche, or Ogeche Lime-tree. He describes it as a tree of great singularity and beauty, growing naturally in water, in the southern states, and rising to the height of about thirty feet. The leaves are oblong, of a deep shining green on their upper sides, and lightly hoary underneath. The flowers are male and female upon different trees, and are produced upon divided, or many-flowered footstalks. The fruit is nearly oval, of a deep red colour, the size of a Damascene Plum, and of an agreeable acid taste, from which it is called the Lime-tree.

Mr. Bartram informs us that he saw large tall trees of this sort on the banks of the Alatamaha river, growing in the water, near the shore. He calls it Nyssa coccinea; and observes that there is no tree which exhibits a more desirable appearance than this, in the autumn, when the fruit is ripe, and the tree divested of its leaves; for then they look as red as scarlet, with their fruit, which is of that colour also. It is the shape of the Olive, but larger, and contains an agreeable acid juice. The leaves are oblong lanceolate and entire, somewhat hoary underneath; their upper surface of a full green and shining; the petioles short. The peduncles are many-flowered. The most northern settlement of this tree yet known, is on Great Ogeche, where it is called Ogeche Lime, from the acid fruit being about the size of Limes, and being sometimes used in their stead.‡

CULTURE.

These trees may be propagated by seeds, procured from places where they grow naturally, and put into the ground as soon as they arrive, for they always lie a year before they come up. Sow them in pots filled with light loamy earth, placing them where they may have only the morning sun; during the first summer the pots must be kept clean from weeds, and in dry weather well watered. In autumn plunge the pots into the ground, and if the winter should prove severe, cover them with old tan, peas-haulm, or other light covering. The following spring plunge them into a moderate hot-bed, hooped over and covered with mats; observing constantly to keep the earth moist. This will bring up the plants by the beginning of May. They must be gradually hardened to bear the open air: during the following summer plunge the pots again into an east border, and well water them in dry weather. In autumn remove them into a frame, where they may be screened from the frost; but in mild weather exposed to the open air. The spring following, before the plants begin to shoot, part them carefully, and plant each in a small pot filled with loamy earth, and if they are plunged into a moderate hot-bed, it will forward their putting out new roots: then they may be plunged in an east border, and in winter sheltered again under a frame. The spring following, such plants as have made the greatest progress, may be planted in a loamy soil, in a sheltered situation, where they will endure the cold of this climate, but unless the ground is moist they make very little progress.

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* Marshall. † Hort. Kew. ‡ Travels, p. 17.

Genus 28. PINUS. *Pine Tree.* Class XXI. Monoecia. Order VIII. Monadelphia.

Species 1. *Common White Larch Tree.* (PINUS LARIX.)

The common or white Larch Tree is of quick growth, and will rise to the height of fifty feet; the branches are slender, and their ends generally hang down. The leaves are long and narrow, in clusters from one point, spreading open above like the hairs of a painter's brush, of a light green, and falling off in autumn; in which circumstance this and the preceding differ from all the other species of this genus. In the month of April the male flowers appear, disposed in form of small cones; the female flowers are collected into egg-shaped obtuse cones, which in some have bright purple tops, but in others they are white: this difference is accidental, for seeds taken from either will produce plants of both sorts: the cones are about an inch long, and the scales are smooth; under each scale two winged seeds are generally lodged.

There are two other varieties of this tree, one a native of America, the other of Siberia; the latter requires a colder climate than England, for the trees are apt to die in summer here, especially if they are planted on a dry soil. The cones of this which have been brought to England, seem to be in general larger than those of the common sort; but there is so little difference between the trees in their characteristic notes, that they cannot be distinguished as different species, though in the growth of the trees there is a remarkable difference.

Mr. Miller mentions another variety from China, which he distinguishes as a species, under the name of *Larix Chinensis*. The cones were sent to Hugh Duke of Northumberland, and the seeds, being sown, grew both at Stanwick and in the Chelsea garden. The cones were much larger than those of the common sort, and ended in acute points: the scales were prominent like those of the Scotch Pine, and had so little resemblance to those of the Larch, that every one who saw them, imagined they belonged to a sort of Pine, and they were sent over under the name of Pine good to keep up banks. As the plants made but little progress the first year, they were weak, and casting off their leaves in autumn were supposed to be dead, and thus most of them were lost; but those which escaped, afterwards shot out their branches horizontally, spreading close to the ground, and seemed to be shrubs, which would never rise upright. They are so hardy, as to thrive in the open air without any protection.

Pallas thus distinguishes the European Larch from the American. In the latter the branches are more slender, with a bark more inclining to yellow, and the scars more slender and clustered; the leaves are more tender, narrower, more glaucous, and the outer ones in each bundle shorter; cones only one-third of the size, blunt, with scales scarcely exceeding twelve in number, thinner, more shining, retuse-emarginate; wings of the seeds straight, more oblong, narrower, and together with the seed itself of a more diluted grey colour.

In the European Larch the bark of the branches is of an ash-coloured grey; the leaves a little wider, bright green, all nearly equal, commonly more than forty in a bundle: the cones an inch long, with above thirty woody, striated, rounded, entire scales. Seeds brownish grey, with subtriangular wings somewhat bent in. In both the cones are bent upwards on very short peduncles.*

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* Flora Rossica, Vol. I. p. 2.

No tree is more valuable, or better deserves our attention in planting than the Larch. It is a native of the South of Europe and of Siberia. It appears from Parkinson's Paradisus that it was cultivated here in 1629;* and Evelyn says, a tree of good stature, not long since to be seen about Chelmsford in Essex, sufficiently reproaches our not cultivating so useful a material for many purposes, where lasting and substantial timber is required. We read of beams of no less than one hundred and twenty feet in length, made out of this goodly tree. There is abundance of this Larch timber in the buildings at Venice, especially about the palaces in Piazza San Marco, where Scamozzi says he used much of it, and infinitely commends it. Nor did they only use it in houses, but in naval architecture also. It seems to excel for beams, doors, windows, and masts of ships: it resists the worm; being driven into the ground it is almost petrified, and will support an incredible weight: it bears polishing excellently well, and the turners abroad much desire it; the Larch makes everlasting spouts, pent-houses and featheredge, which needs neither pitch or painting to preserve them: excellent pales, posts, rails, props for vines, &c. to these add the palettes, on which painters separate and blend their colours; and were the tables on which the great Raphael and most famous artists eternalized their skill.†

In Switzerland, where these trees abound, and they have a scarcity of other wood, they build most of their houses with it; and great part of their furniture is also made of the wood, some of which is white, and some red, but the latter is most esteemed. The redness of the wood is by some supposed to be from the age of the trees, and not from any difference between them, but is rather owing to the quantity of turpentine contained in them. They frequently cut out the boards into shingles of a foot square, with which they cover their houses, instead of tiles or other covering: these are at first very white, but after they have been two or three years exposed, become as black as charcoal, and all the joints are stopped by the resin, which the sun draws out from the pores of the wood, which is hardened by the air, and becomes a smooth shining varnish, which renders the houses so covered impenetrable to either wind or rain; but as this is very combustible, the magistrates have made an order of police, that the houses so covered should be built at a distance from each other to prevent fire, which has often done great damage in villages.

In most countries where this wood is in plenty, it is preferred to all the kinds of Fir for every purpose; and in many places there are ships built of this wood, which they say are durable; therefore this may be a very proper tree for planting upon some of the cold barren hills in many parts of England, which at present produce nothing to their proprietors, and in one age may be large estates to their posterity, and a national advantage; which might be effected without a great expense, where the business is properly conducted.

Line of battle ships are built with Larch at Archangel, which generally last fifteen years. At Venice it is also sometimes employed in ship-building, especially in the lighter parts of the upper works, but not where massy pieces of timber are required, on account of its weight. It resists the intemperature of the air more than any wood known in that country, and therefore is much used for outer gates, pales, &c. In some of the old palaces at Venice there are beams of Larch as when first placed. In a word, wherever strength and durability are required, this is reckoned there the most choice wood they have.‡

Larch wood, says Dr. Anderson, is possessed of so many valuable qualities, that to enumerate the whole would appear extravagant hyperbole. It is known to resist water without rotting almost for ever. The piles of this timber on which the houses of Venice were built many hundred years

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* Hort. Kew. † Silva, p. 153 ‡ Transact. Soc. Arts, Vol. VI. for 1788.

ago, are still found as fresh as when first put in. Stakes of it have been tried in the decoys of Lincolnshire, which between wind and water, have already worn out two or three sets of oak stakes, and do not yet discover any symptoms of decay. It is also known to possess the valuable quality of neither shrinking or warping when put into work, nor is it liable to be pierced by worms in our climate.

It is found to be one of the quickest growing trees, remarkably hardy, and extremely beautiful. It is much more easily reared than the Oak, and could be spread over a great extent of mountains, if sufficiently bare of herbage, at little or no expense, by the natural shedding of its seeds. It would be valuable not only for ship-plank; but even crooked timbers might be obtained, by using a little art to bend it when young. For flood-gates in navigable canals and wet docks it would exceed every thing that can be obtained in this climate. For barrel staves it would be inimitable; and in building it would answer all the purposes to which Fir is now applied, being much stronger and more durable than that wood. When it is also adverted to, that it is next to incombustible, it deserves to be strongly recommended to planters in the country, particularly in the most rugged and barren districts; where, at a very trifling charge, estates might be brought to a hundred times their present value.*

The same valuable author, in the third volume of his Essays relating to Agriculture and Rural Affairs, has one entire long chapter on the value and uses of the Larch tree; in which he says, that it is so much more valuable than the Scotch Fir, that it is now universally preferred to it, for plantations of large extent, in almost every situation. That as it has only been of late introduced into Britain, the qualities of the wood are not sufficiently understood: for before the last thirty years it was cultivated rather as an ornamental tree, than with a view to profit. But wherever it has been introduced it grows so freely; is so beautiful when in leaf; so highly ornamental when covered with its abundant pink blossoms in the spring; and is so elegant in its form, that it is sure to become a favourite with the planter.

Dr. Anderson is so full in his collections upon this subject, that I shall take the liberty of abstracting such parts of his memoir as have not been already given from their primary sources.

Among the Romans the Larch was employed, in preference to every other kind of wood, in building, where strength and durability were required: and Vitruvius attributes the sudden decay of buildings erected in his time, in a great measure to the want of Larch in the neighbourhood of Rome; it having been exhausted before his time, and the expense of bringing it from a distance being so high, as greatly to circumscribe the use of it.

Dr. Pallas, in his Survey of the Russian Dominions in Asia, observed several *tumuli* at Kamtshatka reared at a period so remote, that none of the present inhabitants had any tradition respecting their origin. The platform was covered by Larch wood, over which the mound of earth was raised; and the wood was found to be uncorrupted.

I have in my garden, says Mons. le President de la Tour d'Aigues, in the year 1787, some rails, part of which are Oak, and part of them Larch wood; they were made in 1743, and only once painted. The Oak has yielded to time, but the Larch is still sound. They make casks of it in Provence: the fineness of the grain retains the spirit of the liquor perfectly, and does not alter its qualities: it has been used for that purpose for time immemorial in the higher Dauphine. I have in my castle of Tour d'Aigues beams of twenty inches square, which are sound, though upwards of two hundred years old; but trees of this size are now to be found only in places whence they cannot

* Report on the present State of the Hebrides, p. 238.

be transported. There are in some parts of Dauphiné, and in the forests of Baye in Provence, Larch trees, which two men could not grasp, and about seventy-two feet in height. This account is printed in Memoirs of the Royal Society of Agriculture, Paris 1787.

The Larch must stand to be of a sufficient age before the timber acquires its best qualities of strength and durability. We have not yet had an opportunity of using any of it in perfection in Great Britain; its introduction into this country having been at a period too late to admit of it. The two first trees that were planted in Britain, by the best accounts I can find, are at Dunkeld in Perthshire, the seat of the Duke of Athole. They were planted in 1741: consequently Dr. Anderson should have confined his remark to North Britain, for we have many trees in England prior to these: and some even in Scotland, belonging to Mr. Drummond, were planted in 1734.

It appears from Parkinson's Paradisus, that the Larch tree was cultivated here so long since as 1629: it was then however, as he says, "rare, and nursed up but with a few, and those only lovers of rarities."

The largest of the Larch trees on the Duke of Athole's lawn at Dunkeld was measured in the month of March 1796, and the following are its dimensions:

	F.	In.		F.	In.
At the height of	1	8	from the ground, the circumference is	11	11
	3	0	. . . . .	10	0½
	6	0	. . . . .	9	0
	9	0	. . . . .	8	6
	12	0	. . . . .	8	2
	18	0	. . . . .	7	11
	24	0	. . . . .	7	7

The whole height was eighty-five feet. There are several Larches upwards of one hundred feet in height, which are five or six years younger, but none of so great a girt. The largest of Mr. Drummond's was ninety-seven feet high, but less in circumference.

For a trial, the Duke of Athole has applied Larch to a variety of purposes, such as mill-axles, flooring in houses, window-frames and doors, posts and rails, and boat-building: for all of which it appeared to answer so well, that it is the greatest acquisition of wood ever introduced into Great Britain: especially as it attains a considerable size, on high grounds and bleak exposures, where even Scotch Firs either die or become stinted. Fishing boats made of Larch under forty years growth, last nearly three times as long as those built of Norway Fir.

The late violent winds blew down a Larch in the Duke's lawn of fifty years of age, eighty-six feet six inches in height, containing eighty-two feet of solid wood; for which four pounds sterling was offered as it lay on the ground.

Dr. Anderson has adduced a variety of satisfactory instances and experiments, from which the durability of this wood is established beyond a doubt, even in the early periods of its growth. Nor is this its only good quality; for, when made into planks, there are incontestible proofs of its neither shrinking nor warping, and of its not being liable to be attacked by the worm, during the course of several ages.

It is not yet known whether Larch wood is capable of resisting the sea-worm. Dr. Anderson proposes to ascertain this, by sinking a piece of sound, well-ripened Larch wood, with another piece of sound Oak wood in the river Medway at Rochester bridge, where it is well known that every other kind of wood is very soon perforated by the sea-worm.

Larch wood is in a manner incombustible: that is, though it may be consumed by fire, yet where the masses are large, even if a fire be placed on the bare wood, though it will be slowly

corroded by it, yet, unless in particular circumstances, it cannot be made to flame so as to communicate it to other bodies. This quality of Larch wood was known in the time of Julius Cæsar, who calls it *lignum igni impenetrabile*: and Mr. Harte observes, that there is perhaps no instance of the cottages in Carniola being set on fire, though they are so careless as to throw flaming firebrands on their roofs.* This seems to contradict what was said above with relation to Switzerland; but I apprehend that more of the houses of that country are built of Fir than of Larch. Duhamel however, in confirmation of Mr. Miller's opinion, says, that the resinous substance in Larch trees is looked upon to be very combustible, and therefore there is a public order in the district near Briançon, that houses built with it should never join, but stand at a certain distance.† Or rather Mr. Miller copied from Duhamel.

Matthiolus informs us, that unwilling as this wood may be to take fire, yet it is no ways difficult to burn it in kilns, glass-houses and furnaces belonging to iron-works, when once the inside of these receptacles is rendered intensely hot. Such is the practice in the iron-works of Stiria and the bishopric of Trent, where this wood is of singular use, when there is heat sufficiently fierce and strong to penetrate it forcibly. On this point, says Mr. Harte, experience alone can lead us to adopt the true opinion. Though I have carefully looked over this learned author's essays, yet I cannot find what Dr. Anderson quotes from them, on the incombustibility of the Carniolian cottages.

To the other uses of Larch wood, Mr. Harte adds, that because it is not liable to be warped or to be attacked by worms, the Italians use it for back-boards, to place behind fine drawings, when they frame and glass them; as also for picture-frames, table-frames, &c. because no other wood gives gilding such force, brightness, and as it were a sort of natural burnishing; and this is the main secret why Italian gilding on wood is so greatly preferable to ours, which has often a tarnished spongy cast; and looks likes gingerbread. The Italians also prefer it for making the wheels of post-chaises and other carriages, as being very durable and unapt to crack. No boards make better wainscotting, or take paint better. The application of it to shingles for covering barns and other outhouses would be invaluable in these kingdoms. The look of it would be far better than thatch; neither rains would rot it, nor winds ruffle it; and if it will not easily catch fire, it is a great additional recommendation. Whereas thatch is liable to all these accidents, and harbours sparrows, insects, cobwebs, dust and all sorts of foulness, to the great detriment of the grain: and though thatch be cheaper at first, it is dearer in the long run than tiling or slating. The shingles in the Grisons are half an inch thick and a foot square: being of a tough nature and nailed down to the rafters, they are not liable to the inconvenience of being broken by forks, like tiles or slates.‡

On account of the valuable qualities of the wood therefore, the Larch deserves to be cultivated in this country. Another recommendation of it is, its quickness of growth. Eight trees being measured in the spring and autumn of the year 1794, the average of their increase in height was nearly three feet nine inches and a quarter; and one of them increased three inches in circumference at two feet above the ground. In another plantation, the trees at eight years growth measured above twenty feet in height on an average; the trees were from six to nine inches high when planted. At twelve years old they measured, on an average from thirty-four to thirty-six feet in height. This plantation was on a good soil and in a favourable situation.

Nor is it only while the tree is young that it makes these vigorous shoots; for it appears by the

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* Sect. III. p. 370, &c. † Harte, Essay I. p. 151. ‡ Ibid. p. 150.

measurement of the trees in Dunkeld, that this in a great measure continues even till a period of age beyond that which they have as yet attained: for one hundred and twenty feet in fifty years gives an average of nearly two feet and a half in height for each year of their growth.*

According to Mr. Harte, it grows slowly the first four years; but in twenty years, will exceed a Fir tree both in height and circumference that is double its age. Nor is there any reason, he adds, for doubting whether this tree will thrive in England: for some Larches about forty years ago came to full size and perfection near Chelmsford in Essex; and Mr. Miller mentions others of a considerable growth at Wimbledon in Surry, which produced a large quantity of cones every year.† This was said at least as far back as the year 1770: and Mr. Evelyn speaks of a Larch at Chelmsford.

The Bishop of Landaff informs us; that from many experiments made by himself, and collected from others, he finds the annual increase in circumference of the Larch, at six feet from the ground, to be one inch and an half on an average of several years; and that this inference has been drawn from the actual admeasurement of Larches in different parts of England and Scotland, and of different ages from ten years old to fifty.‡

In making a plantation of Larch, the thinnings may be applied to a variety of useful purposes, whilst they are yet of a small size. In six, eight, or ten years, according to soil and circumstances, the trees will have attained a size sufficient to be made into hay-rakes. They grow so straight, and the wood is so light, strong and durable, as to be peculiarly calculated for this purpose; and from its shrinking less than any other wood, these rakes will remain longer firm than those made from any other. About two feet cut off from the root end will form the rake-head; and five feet above that, with a very little taken off from the thickness of the under part, will form the handle. No wood is more proper for the teeth of the rake, than some of the red wood of an older tree, because it is not only tough, but little liable either to split or shrink. The bow may be made of Ash, or of the laurel leaved sweet-scented Willow, (*Salix pentandra*) which is still better. Nothing is so fit for shafts to hoes; for it is nearly as strong, and much more durable than Ash. Handles for brushes, brooms, scythes, &c. would occasion a vast consumption of these small spars.

Light, neat and strong chairs, for rush bottoms, might be made of Larch wood at this age.

Nothing will answer better for hop-poles; for one set of these would outlast two or three sets of Ash. Hurdles, spars and gates, may be made of it, both lighter and more durable than of any other wood: and when the trees are of a size sufficient, they may be split down for cart shafts; and in mining countries they might be employed as posts for supporting the roofs of the mines.

The small tops cut off in making these various works, would furnish a neat, elegant, cheap and durable kind of railing, to be put upon the top of low walls, especially for preventing light sheep from over-leaping them. One end might be let into the coping, whether of sod, clay, or lime; and the other end received into a slip of sawn Larch wood, with holes bored through it to receive their points. From the straightness of the wood, this kind of rail would be very neat without much expense. In the same manner hen-coops, crates for packing glass, &c. might be made of those materials.

But one of the most extensive and beneficial uses of this kind of small wood, is for the purpose of inclosing. These spars, when the root is thick enough, may be slit up the middle by a saw, and cut into lengths of five or six feet; or if smaller they may be employed whole. As they are always

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* Anderson, vol. III. p. 403. † Harte, Essay I. p. 151.

‡ Agricult. Survey of Westmoreland, Prelim. Observations.

straight, and nearly of an uniform thickness, if driven into the ground for a few inches in a row, at the distance of a few inches from each other, with the split sides all one way, they would make one of the neatest and most complete fences that can be seen. The tops of these uprights may be received into a piece of sawed plank, with holes bored in it for that purpose; and supported at due distances by sloping pieces reaching from the ground to the top.

These are a few of the uses to which the small spires from the first thinnings of the plantations may be applied. As they advance to a larger size, for windows, joists, flooring, panelling, couples, rafters, and every other purpose in building, they would be superior to any other kind of wood hitherto employed for these purposes; and for ship-building, especially planks, it would be superior to Oak itself.

There is not a branch or a twig of the Larch, that may not be put to some useful purpose. The larger branches may be employed in fencing, and the smaller brush for filling drains and for fuel. In drains, it is more durable than any other wood; and though the timber will not burn readily, yet the brush is found to make a fire almost equal to the billets of many other trees.*

The acknowledged utility of the Larch, induced the truly respectable Society for the encouragement of Arts, Manufactures and Commerce, at London, to offer very early both honorary and pecuniary rewards for the propagation of this tree; and so long since as the year 1788 three gold medals and a premium of thirty pounds had been bestowed by the Society for planting Larch, and giving an account of the utility of the wood.

This attention of the Society, and a conviction of the superior qualities of the Larch impressed upon the minds of gentlemen in various parts of these kingdoms, has induced them to make some considerable plantations; and we are informed by Mr. Drummond, of Blair Drummond in Scotland, son to the late Lord Kaims, that by the great plantations of Larch, yearly made both in England and Scotland, the value of this excellent tree is now well understood; and if these plantations are continued for some years with the same spirit, there can be little doubt, that in half a century, the many thousand pounds annually sent to Norway for timber, will be entirely saved to this country.†

Some of these plantations are the following.—John Sneyd, Esq. of Belmont in Staffordshire, between the years 1784 and 1786, planted 13000 Larches.

The Duke of Athole, alone, says Dr. Anderson, plants 200,000 Larches every year; and one nurseryman at Edinburgh has this year (1796) above five millions.

A valuable produce of the Larch tree is the Venice Turpentine, which issues spontaneously from the bark, but is more commonly obtained by boring a hole with an auger about two feet above the ground, till it reaches near to the heart of the tree; into this hole is inserted a small pipe or cock, through which the turpentine flows into proper vessels placed for its reception. This process is continued from the end of May till the end of September. When the trees will yield no more that season, the turpentine is pressed through a cloth to purify it. This is usually thinner than any of the other sorts, of a clear whitish or pale yellowish colour, a hot pungent bitterish disagreeable taste, and a strong smell, without any thing of the aromatic flavour of the Chian or Cyprus Turpentine obtained from *Pistacia Terebinthus.* The common and Strasburgh Turpentine is from the *Pinus Picea:* and the Canada balsam, which may be considered as the purest of the Turpentines, is procured from the Silver and Balm of Gilead Firs.

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* Anderson's Essays, Vol. 3. p. 407 to 422. † Transact. Arts, Vol. VII. for 1789.

The turpentine is not to be obtained in considerable quantities from very young trees, and in old ones it gradually dries up, till at last it affords none: it is only after the tree has attained the thickness of ten or twelve inches in diameter, that it is thought worth while to collect the turpentine; and from that time, during forty or fifty years, if it continues so long in vigorous growth, the tree will continue to yield annually from seven to eight pounds of turpentine.

An English acre will contain six hundred and eighty-two trees, at the distance of eight feet from each other. Suppose the annual produce to be six pounds a tree on an average, and the price to be no more than two-pence the pound, (the common turpentine that the painters use is now, 1799, six-pence a quart,) the value of the produce would be 3l. 4s. 2d. the acre; on supposition that the trees would yield as much turpentine in Britain, as on the borders of the Adriatic gulf. Whether they will do so, remains to be ascertained by experiment.

Besides this well known product the Larch yields also a Manna and a Gum. The Manna is found in the South of France, and is called there *Manne de Briançon:* it is white, concrete, and sweet, like fine new honey. It is rare, and met with only in little drops, so that it would be very difficult to collect a pound of it. The drops are more or less hard, and adhere to the leaves.

Mons. Villars having made some enquiries relative to this substance with Mons. Guettard in the year 1773, found it at sun-rise almost fluid; and picked up drops of it on the turf exactly like those which remained on the trees; but they have not given any analysis or farther account of it, except that the season of 1773 was less productive of Manna than usual.* Last year (1798) I observed a Larch near my house covered with a hoary powder, but I neglected to examine whether it had any of the qualities of Manna. In the present year there is no appearance of it. The last season was a hot dry one, and therefore favourable to the production of Manna; and the season of 1799 has been a cold wet one.

Pallas informs us that they have this Manna in the Russian empire, but that it is rarely found concrete, being commonly soon washed off by the rains which are frequent on the Uralian mountains.

He remarks also, that the turpentine resides in the bark and the wood next to it, as is apparent when the trunk of a Larch is sawed transversely; for then it may be seen that the inner wood for more than half the diameter is dry. It cannot therefore be of any use to drive the auger almost to the centre of the tree, as Dr. Anderson recommends.

Pallas also mentions a Gum that is yielded by the Larch in particular circumstances. When the woods are on fire, which frequently happens in Russia, the Larches are easily burnt on the side next the flame to the height of several feet, on account of the turpentine with which they abound. If the wood happens to be scorched to the pith, the inner part exudes a dry, reddish gum, rather less glutinous than Gum Arabic, having a slight taste of resin, but wholly soluble in water. It is used in medicine; and the native mountaineers chew it to fasten their teeth, as an antiscorbutic, and as a substance highly nutritive; they also use it as a glue to fasten their bows, &c.

The Siberian hunters of Ermines, when their ferment or yest which they carry with them to make the acid liquor which they call *Quass* with, is spoiled by the cold, scrape off the albumen or half-formed wood between the bark and the wood, which is very juicy and sweet, digest it with water over the fire during an hour, mix it with their rye meal, bury the dough in the snow, and after twelve hours find the ferment ready prepared in the subsiding feces.†

Old Larches produce a Fungus, which is described very much at large by Jacquin, in the first

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* Plantes de Dauphiné, 3. 808.

† Flora Rossica, 1. p. 2, 3.

volume of his Miscellanea, under the name of *Boletus Laricis*. It is also called *Agaricus purgans*: and is used in the northern countries as an emetic in intermitting fevers. The Funguses dye the hair of the rein deer with this Fungus and the roots of Gallium, of a very deep red colour; whence perhaps it may be of some use in dyeing. The body of this Fungus is saponaceous, and is used by the women in some parts of Siberia, to wash themselves, and even their linen.* It was celebrated formerly, but is now deservedly fallen into total disuse, as a medicine.

From the Pines properly so called, with the Cedar and Larches their allies, we discriminate the Firs, which are distinguished from them by having the leaves single and distinct at the base; whereas the former have them two or more, or even in bundles, from the same sheath.

Genus 29. Pistachia, *Turpentine Tree.* Class XXII. Dioecia. Order V. Pentandria.

Species 1. *Pistachia Tree.* (Pistachia Officinalis.)

Species 2. *Turpentine Tree.* (Pistachia Terebinthus.)

For an account of these trees vide last Section, p. 410.

CULTURE.

The Pistacia-nut tree is propagated by the nuts, obtained from abroad, planted in pots filled with light kitchen-garden earth, and plunged into a moderate hot-bed: when the plants appear, admit a large share of air to them, to prevent their drawing up weak; and by degrees harden them to bear the open air, to which expose them the beginning of June till autumn, when they should be placed under a hot-bed frame to screen them from the frost in winter, for while they are young, they are too tender to live through the winter in England without protection, but they should always be exposed to the air in mild weather; these plants shed their leaves in autumn, and therefore should not have much wet in winter; and in the spring, before the plants begin to shoot, they must be transplanted each into a separate small pot; and if they are plunged into a very moderate hot-bed, it will forward their putting out new roots; but as soon as they begin to shoot, they must be gradually hardened, and placed abroad again; these plants may be kept in pots three or four years till they have got strength, during which time they should be sheltered in winter; and afterwards they may be turned out of the pots, and planted in the full ground, some against high walls to a warm aspect, and others in a sheltered situation, where they will bear the cold of our ordinary winters very well, but in severe frosts they are often destroyed. The trees flower and produce fruit in England, but the summers are not warm enough to ripen the nuts.

The Turpentine tree may be treated in the same manner, and is as hardy. The plants of this sort are generally propagated by laying down their young branches, which, if properly managed, will put out roots in one year, and may then be cut off from the old plants, and each transplanted into separate small pots. These must be sheltered in winter, and in summer placed abroad in a sheltered situation, and treated in the same way as other hardy kinds of green-house plants. It

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* Flora Rossica, 1. p. 3.

may also be propagated by seeds in the same way as the others; but if the seeds are not taken from trees growing in the neighbourhood of the male, they will not grow; and if they are kept out of the ground till the spring following. When these plants have obtained strength, some of them may be turned out of the pots, and planted against warm walls; where, if their branches are trained against the walls, they will endure the ordinary winters very well, and with a little shelter in severe winters they may be preserved.

Genus 30. PLANTANUS. *Plane Tree.* Class XXI. Monoecia. Order VII. Polyandria.

Species 1. *Oriental Plane Tree.* (PLATANUS ORIENTALIS.)

The oriental Plane-tree grows naturally in Asia, where it becomes very large; the stem is tall, erect, and covered with a smooth bark, which annually falls off; it sends out many side branches, which are generally a little crooked at their joints; the bark of the young branches is of a dark brown, inclining to a purple colour; the leaves are placed alternate, on foot-stalks an inch and a half long; the leaves themselves are seven inches long and eight broad, deeply cut into five segments, and the two outer are slightly cut again into two more; these segments have many acute indentures on their borders, and have each a strong midrib, with many lateral veins running to the sides; the upper side of the leaves is of a deep green, and the under side pale. The flowers come out upon long peduncles hanging downward, each sustaining five or six round balls of flowers; the upper, which are the largest, are more than four inches in circumference; these sit very close to the peduncle. The flowers are so small as scarce to be distinguished without glasses; they come out a little before the leaves, which is the beginning of June; and in warm summers the seeds will ripen late in autumn, and if left upon the trees will remain till spring, when the balls fall to pieces, and the bristly down which surrounds the seeds, helps to transport them to a great distance with the wind.

Du Roi remarks, that the leaves vary in figure, but are always smooth; and that the peduncles are brown. Pallas says, that the leaves, when young, are white-tomentose; but when old, the petioles only are so; that the peduncles are smooth; that it differs most from the Occidental Plane-tree in having scarcely any stipules on the adult branches; and that the wood is very hard, reddish with brownish-grey transverse streaks.

Native of the Levant, and many other parts of Asia. On Mount Taurus, Athos, Macedonia, Lemnos, Crete, mostly near water.* In Persia and perhaps Georgia, where there are very handsome trees, four yards in circumference; on Mount Caucasus, where it is very common, it takes the form of a large shrub; as the American Plane does, in the gardens at St. Petersburgh.†

The Plane-tree has always been much esteemed in the Eastern countries, where it grows naturally, for its beauty, and grateful shade. Evelyn, Miller, and Gilpin have related at length, from Ælian, the adoration that was paid by Xerxes, to a tree of this sort in Phrygia. And wherever any sumptuous buildings were erected in that country, the porticoes, which opened to the air, generally terminated in groves of lines of these trees.

It was no less esteemed in Italy after it was introduced there. Pliny informs us, that it was

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* Linn. † Pallas.

A Cutting from the Oriental Plane Tree.

Henderson del. Warner sculp.

London. Published by Dr. Thornton Nov.r 1.1808.

first brought over the Ionian sea, into the island of Diomedes, for a monument to that hero; thence it passed into Sicily, and so into Italy.* It was planted near their houses, and in rows for walks; and was even irrigated with wine.

Pliny affirms, that there is no tree whatsoever which so well defends us from the heat of the sun in summer, or that admits it more kindly in winter; the branches being produced at a proportional distance to the largeness of the leaves; (which holds good in all sorts of trees yet known); so that when the leaves are fallen in winter, the branches easily admit the rays of the sun. Virgil calls the Platanus *sterilis*, not because it bears no seed, but no fruit that is eatable.

Mr. Miller says, it is generally supposed, that the introduction of this tree in England is owing to the great Lord Chancellor Bacon, who planted a noble parcel of them at Verulam, which were very flourishing some years since, but have lately been destroyed.

Mr. Evelyn also says, the introduction of this true Plane among us, is *perhaps* due to the great Lord Chancellor Bacon, who planted those, still flourishing ones (1706) at Verulam. He adds, that he owed a hopeful plant then growing at his own villa to the late Sir George Crook, of Oxfordshire. He speaks of the true Plane of antiquity, as being very rare in England in his time, and of the American Plane as more common.

Mr. Miller also informs us, that there were very few large Oriental Plane Trees to be seen; which he thinks might be owing to the great esteem persons of the last age had for the Lime Tree, which being much easier to propagate, and of quicker growth during the three or four first years, became more fashionable for avenues and shady walks near habitations.

But we had the Oriental Plane-tree in England certainly before the time of Lord Bacon; for it appears from Turner's Herbal, that it was cultivated here as early as 1562;† whereas the Chancellor was born only in 1561. The plantations however at Verulam might be the first of any note or consideration.

Mr. Boutcher from Evelyn, and he from Riecciolus, says that the Turks used to build most of their ships with this timber; that it was hard, close, takes a fine polish, and is valuable for a variety of useful purposes. Mr. Marshall, seemingly with more reason, ranks this wood with that of the Great Maple, vulgarly called Sycamore, and in the North of England Plane Tree.

With us it is considered merely as an ornamental tree, and is not so common as the American Plane even in ornamental plantations. Notwithstanding its backwardness in coming out in the spring, and the sudden decay of its leaves in autumn, yet for its goodly appearance, and the great size to which it will grow, the Oriental Plane deserves a place in all large plantations, or shady recesses, especially near the mansion, or on a moist soil and near streams of water, in which situations it will arrive at a prodigious magnitude.

Lady Craven speaks of some which she saw in the Turkish dominions of a size so gigantic, that the largest trees we have in England, placed near them, would appear only like broomsticks.

Pausanias tells us of a Plane-tree of extraordinary size and beauty in Arcadia, supposed to be planted by Menelaus; so that the age of the tree, when Pausanias saw it, must have been about thirteen hundred years.‡ That the tree was large and handsome we may believe, but no tradition can be sufficient to persuade us that a Plane-tree ever attained such an age, provided it was sound when Pausanias saw it.

Pliny mentions other remarkable Plane-trees: as one in Lycia that had mouldered away into an

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* Martyn's Virg. Georg. 70. p. 121.

† Hort. Kew.

‡ Gilpin's Forest Scenery, Vol. I. p. 50. and 125.

immense cave, eighty feet in circumference. Licinius Mutianus, governor of the province, with eighteen others dined commodiously on the benches of pumice placed round the body of it.

Caligula also had a tree of this sort at his villa near Velitræ. The hollow of the trunk held fifteen persons at dinner, with a proper suite of attendance.*

That which is called Maple-leaved Plane is certainly a seminal variety of the Eastern Plane, for the seeds which scattered from a large tree of this variety in the Chelsea garden have produced plants of the common sort several times. The Maple-leaved Plane has not its leaves so deeply cut as those of the Eastern Plane: they are divided into five segments, pretty deep, but are not lobed, like those of the Occidental Plane. The petioles are much longer than in either of the species, and the upper surface of the leaves is rougher, so that they might be taken for different sorts, if we did not know that they rose from the same seeds.

The Spanish Plane-tree has larger leaves than either of the sorts; and are more divided than those of the Occidental, but not so much as those of the Oriental. Some of the leaves are cut into five, and others into three lobes only; these are sharply indented on the edges, and are of a light green; the foot-stalks are short, and covered with a short down. This is by some called the middle Plane-tree, from the leaves being of a shape between the two species.

Species 2. *American Plane Tree.* (Platanus Occidentalis.)

The Occidental Plane-tree grows naturally in most parts of North America; this tree also grows to a large size, the stem very straight, and of equal girt most part of the length: the bark is smooth, and annually falls off like that of the other: the branches extend wide on every side; the young ones have a brownish bark, but the old ones have a grey bark; the foot-stalks of the leaves are three inches long; the leaves are seven inches long, and ten broad: they are cut into three lobes or angles, and have several acute indentures on their borders, with three longitudinal midribs, and many strong lateral veins. The leaves are of a light green on their upper side, and paler on their under. The flowers grow in round balls like the former, but are smaller. The leaves and flowers come out at the same time with the former, and the seeds ripen in autumn.

Kalm, who calls it the Virginian Maple, says that it grows in plenty on the shores of the Delaware. The English Americans call it Button-wood, (from the catkins or aments) or Water Beech, which is more common. It grows mostly in low places, but especially on the edge of rivers and brooks. It is easily transplanted to drier places, if the soil be good; and as the leaves are large and the foliage thick, it is planted about houses and in gardens, to afford a pleasant shade in the hot season. It likewise grows in marshes and in swampy fields, with the Ash and Red Maple. It is remarkable for its quick growth; and is frequently as tall and thick as the best Fir trees. There are such numbers of them on the low meadows between Philadelphia and the ferry at Gloucester, on both sides of the road, that in summer it is a shady walk all the way. In Philadelphia near the Swedish church, some great Plane-trees stand on the shore of the river.

It appears from Parkinson that the American Plane was introduced here before 1640, by Mr. John Tradescant, junior.† Johnson, in his additions to Gerarde's Herbal, printed in 1633, mentions that there were two young ones at that time growing with Mr. Tradescant. He does not seem indeed to have known that these were of a different species from those which Gerarde says his servant William Marshal (whom he sent into the Mediterranean sea as surgeon unto the Hercules of London)

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* Gilpin's Forest Scenery, Vol. I. p. 123—125. † Hort. Kew.

found growing in Lepanto, hard by the sea side, at the entrance into the town, a port of Morea; and from thence brought one of the rough buttons, being the fruit thereof. These were Oriental Planes; but there is no doubt that the young trees growing with Mr. Tradescant were Occidental Planes.

In more than a century and half it has not become very common, although, as Mr. Marshall says, it is particularly refreshing to the eye, and truly ornamental; the bright colour giving variety to groves and masses of wood; and in single trees or groups being singularly elegant.

The stem of the Occidental Plane, says Mr. Gilpin, is very picturesque: it is smooth and of a light ash colour, and has the property of throwing off its bark in scales; thus naturally cleansing itself, at least its larger boughs, from moss and other parasitical incumbrances.

No tree forms a more pleasing shade. It is full-leafed, and its leaf is large, smooth, of a fine texture, and seldom injured by insects. Its lower branches shooting horizontally, soon take a direction to the ground; and the spray, by twisting about in various forms, fills up every little vacuity with shade. At the same time it must be owned, the twisting of its branches is a disadvantage, when the tree is stripped of its leaves, and reduced to a skeleton. Nor indeed does its foliage, from the largeness of the leaf, and the mode of its growth, make the most picturesque appearance in summer. The summer-leaf also both of this and the Oriental Plane, wears so light a hue, as to mix ill with the foliage of the Oak, the Elm, and other trees. On the skirts of a plantation they sometimes form, during the summer, a disagreeable spot. In autumn, their leaves receive a mellow tint, which harmonizes very well with the wanning colour of the wood.

One of the finest Occidental Planes, adds Mr. Gilpin, stands in my own garden at Vicar's-hill, where its boughs, feathering to the ground, form a canopy of above fifty feet in diameter.

At Shadwell Lodge in Norfolk, the seat of John Buxton, Esq. a Plane-tree was planted in April 1744; it was then eight feet high. In April 1775, the height was sixty-five feet nine inches; the girt at half a foot from the ground was seven feet nine inches; at twenty feet, four feet six inches.*

CULTURE.

The Eastern Plane-tree is propagated either from seeds, or by layers, the latter of which is generally practised in England; though the plants thus raised seldom make so large straight trees, as those which are produced from seeds; but it has been generally thought that the seeds of this tree were not productive, because they have not been sown at a proper season, nor managed in a right manner; for I have had thousands of the young plants spring up from the seeds of a large tree, which scattered upon the ground in a moist place: and I since find, that if these seeds are sown soon after they are ripe, in a moist shady situation, they will rise extremely well; and the plants thus obtained, will make a considerable progress after the second year, being much hardier and less liable to lose their tops in winter, than those which are propagated by layers. And since the seeds of this tree frequently ripen well in England, they may be propagated in as great plenty as any other forest-tree.

The Plane-tree will grow extremely well from cuttings, if they are planted the beginning of October upon a moist soil; and if they are watered in dry weather, will make a prodigious progress: so that in a few years from the planting, they will afford noble trees for planting avenues, and other shady walks; and their trunks are perfectly straight, growing nearly of the same size to a consider-

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* Hunter's Evelyn.

able height, there being the least difference in the girt of this tree, for several yards upwards, of any sort of tree whatsoever. The Hon. Paul Dudley, Esq. in a letter to the Royal Society, mentions one of these trees, which he observed in New England, whose girt was nine yards, and held its bigness a great way up, which tree, when cut down, made twenty-two cords of wood. He also says, in the same letter, that he had propagated many of these trees by cutting off sticks of five or six feet long, and setting them a foot deep into the ground in the spring of the year, when the season was wet, and that they always thrive best in a moist soil.

In the winter screen the seed-beds with pea-straw, rotten tanner's bark, or some other light covering, that can easily be removed in mild weather. In the spring, before the seeds vegetate, rake the beds gently over with a short-toothed rake, sifting a little fresh rich mould on them, and in dry weather during summer let them be watered. The following autumn, the beds having been made quite clean, put a little more good mould about the plants; after which they will require no farther trouble, but keeping them clean, till they have had another season's growth, when they may be removed into the nursery in spring:* in rows one yard asunder, and eighteen inches distance in the rows. Though many of the seeds will come up the first spring; yet the general crop must not be expected till the second.

Genus 31. Populus. *Poplar.* Class XXII. Dioecia. Class IV. Tetrandria.

Species 1. *White Poplar.* (Populus Alba.)

The White Poplar grows very tall, with a straight trunk, covered with a smooth whitish bark. Leaves smooth, blackish green above, but having a thick white cotton underneath; they are about three inches long, on petioles an inch in length, flatted and grooved on each side: in young trees the leaves are roundish, but in adult ones angular, divided into three, five or seven lobes; they are without glands, either at the base or on the serratures. The flowers are exactly similar to those of *P. tremula.*†

Native of Europe, from Sweden to Italy, also of Siberia and Barbary: in woods, hedges, and near rivers and brooks.

The leaves of the Great White Poplar, or Abele-tree, are large, and divided into three, four, or five lobes, which are indented on their edges; they are of a very dark colour on their upper side, and very white and downy on their under, standing upon foot-stalks which are about an inch long. The young branches of this tree have a purple bark, and are covered with a white down, but the bark of the stem and older branches is grey. In the beginning of April the male flowers or katkins appear, which are cylindrical, scaly, and three inches long, and about a week after come out the female flowers or katkins, which have no stamina like those of the male. Soon after come out, the male katkins fall off, and in five or six weeks after, the female flowers will have ripe seeds inclosed in a hairy covering, when the katkins will drop, and the seeds will be wafted by the winds to a great distance.

The leaves of the common White Poplar are rounder, and not much above half the size of those of the Abele; the shoots of the Abele are paler, the katkins are larger, and the down of the seeds is whiter and longer.

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* Boutcher. † Linnæus, Ray, Lightf. Withering.

Poplar

Mortimer says justly, that the Abele is a sort of White Poplar, only much finer, bears a larger leaf, and makes a much stronger shoot, being a much quicker grower. He adds, that the best sort comes from Holland and Flanders. Hence in some places it is called Dutch Beech.

Samuel Hartlib, in his Compleat Husbandman, 1659, says, that some years ago there were ten thousand Abeles at once sent over into England from Flanders, and transplanted into many counties. This timber is incomparable, says he, for all sorts of wooden vessels, especially trays; and butcher's trays cannot well be made without it, being so exceeding light and tough.

The finest Abeles I ever saw were in Buckinghamshire, at Hartwell near Aylesbury, the seat of the late excellent Sir William Lee, Bart. They are remarkably tall, with the cleanest bole imaginable.

A specimen of their advance, says Evelyn, we have had of Abele Tree at Sion, which being lopped in February 1651, did by the end of October, 1652, produce branches as big as a man's wrist, and seventeen feet in length. As they thus increase in bulk, their value advances likewise, which after the first seven years is annually worth twelve pence more. The Dutch therefore look upon a plantation of these trees as an ample portion for a daughter, and none of the least effects of their good husbandry; which may well be allowed, if the calculation hold of Sir Richard Weston, who began his plantation not long since about Richmond; that thirty pounds being laid out in these plants, would render at the least ten thousand pounds in eighteen years; every tree affording thirty plants, and every one of them thirty more, after each seven years improving twelve pence in growth, till they arrive to their *acmé*.

An Abele Tree planted at Seething in the year 1760, in stands without roots (truncheons) ten or eleven feet long, on a bank about thirteen feet broad, with water on each side, at about five feet from the ground measure five feet to five feet nine inches in circumference, and are tall flourishing trees.*

The wood of White Poplar, says Mr. Evelyn, is sought of the sculptor; and they saw both this and the Black into boards, which continue a long time where they lie dry. In sword and buckler days they made shields of this material. They serve also for wheel-barrows, and the sides of waggons and carts, and may be considered as an useful substitute to the Ash.†

Truncheons of the White Poplar and Abele, nine feet long, and the size of a common hop-pole, planted in 1775, on the gravelly bank of a stream, some yards from the current, in twelve years were from twenty-four to twenty-eight inches in girth, five feet from the ground, and in height were equal to many oaks taken down for timber.‡

A White Poplar in St. John's College walks, Cambridge, blown down in a hurricane on Friday morning, November the sixth, 1795, was forty-two feet in length, girted twenty-nine inches and a half, and including the three arms contained three hundred and twenty-eight feet.

It is of quick growth and bears cropping, but is unfavourable to pasturage. The wood is soft, white, and stringy, and makes good wainscotting, being little subject to swell or shrink. Floors, laths, packing cases and turner's ware are made of it.§ I have seen beautiful floors laid with planks of the Abele.

Species 2. *Trembling Poplar Tree, or Aspin.* (Populus Tremula.)

The Trembling Poplar or Asp, as it is called from the German *Espe*, which is the general name for all Poplars, has a green smooth bark. The leaves at first breaking out are hairy above and

* Bath Memoirs, 5. 445. † Kent's Hints. ‡ Bath Memoirs. § Withering.

cottony underneath, but when full grown are smooth; they are slightly heart-shaped, smaller and more approaching to circular than in the preceding, with a few angular teeth on the edges.* Linnæus says, that they are rolled inwards at the edge, and that they have two glands running one into the other on the inner side above the base. He also observes from Gouan, that the leaf-stalks are flatted towards the end, whence the perpetual trembling of the leaves with every breath of wind. But the petioles being flat in the White and Black Poplars as well as in this, Dr. Stokes accounts better for the phenomenon, from the plane of the long leaf-stalks being at right angles to that of the leaves, which allows them a much freer motion than could have taken place had their planes been parallel. This trembling of the leaves has been so generally noticed as to have become proverbial among us; and Mr. Lightfoot informs us that the Highlanders of Scotland account for it, from a superstitious notion that our Saviour's cross was made of this tree, and that therefore the leaves can never rest.

Of the Aspen, says Evelyn, our woodmen make hoops, fire-wood, coals, &c. and the bark of young trees, in some countries, serves for candle or torch-wood. He thrusts down a more searching foot, and takes it ill to have his head cut off, as the same author quaintly expresses it. Villars also says that it will not bear lopping, like the Black Poplar.

This tree is of speedy growth, and will grow in any situation or soil, but worst in clay. It impoverishes the land: its leaves destroy the grass, and the numerous shoots of the roots spread so near the surface, that they will not permit any thing else to grow. The wood is extremely light, white, smooth, woolly, soft, durable in the air. The bark is the favourite food of beavers.† Pannels or pack-saddles, canns, milk-pails, clogs, pattens, &c. are made of the wood.‡

The leaves and leaf-stalks sometimes are set with red glandular substances, about the size of a pea, which are the nests of *Tipula juniperina*.

Native of Europe, from Sweden to Italy; in moist woods and in boggy ground.

Species 3. *Black Poplar Tree.* (Populus Nigra.)

The Black Poplar has a naked lofty trunk, covered with an ash-coloured bark, and a regular handsome head.§ Leaves slightly notched on their edges, smooth on both sides, and of a light green colour. They have no glands at the base, but the serratures are glandular on the inner side.‖ The petioles are yellowish.¶ According to Linnæus, the stamens are as many again as in *P. tremula*: Leers says they are sixteen in number. Mr. Miller observes that the catkins of this sort are shorter than those of the two former. Capsule compressed a little at the top and somewhat acuminate, the rest turgidly lenticular, one-celled; valves concave spreading horizontally. Seeds oblong roundish, whitish; saving with hairs at top four times as long as the seed.

This is a tree of quick growth, and on the banks of rivers, and in moist situations it grows up to a great height, throwing out numberless suckers from the roots. It loves a moist black soil, and bears cropping well. The bark, being light cork, serves to support the nets of fishermen. The wood is not apt to splinter: it is light and soft, and sometimes used by turners. It is incomparable, says Mr. Evelyn, for all sorts of white wooden vessels, as trays, bowls, and other turner's ware; and is of especial use for the bellows-maker, because it is almost of the nature of cork, and for ship-pumps, though not very solid, yet very close and yet light; so as it may be used for the soles, as well as

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* Lightfoot. † Withering. ‡ Lightfoot.
§ Idem. ‖ Linn. ¶ Withering.

wooden heels of shoes, &c. Vitruvius reckons it among the building timbers. Likewise to make carts, because it is exceeding light; for vine, and hop-props, and divers vimineous works.'

It makes useful rafters, poles and rails, and in a proper soil, makes a very quick return for such purposes.' It is excellent for flooring boards, and is much used for the purposes of deal in some of the midland counties. The boards are so slow in taking fire, that the flames are said to have been stopped at that part of a building on fire, where this timber had been used. It smokes a long time before it bursts into flame:' and of course is a bad wood for fuel. One of the best uses to which the wood of this and other Poplars can be applied is for packing-cases.'

The loppings in January are for the fire, where fuel is dear, but they burn untowardly, and rather moulder away, than maintain any solid heat. Of the twigs, with the leaves on, are made brooms. The catkins attract the bees, as do also the leaves, which are more tenacious of mildews than most forest trees, the oak excepted.' The red substance like berries, upon the leaf-stalks, as large as a cherry, bulging on one side and gaping on the other, are occasioned by an insect called *Aphis bursaria*. Many species of insects are supported by this and the other Poplars.'

The leaves are gathered in some parts of Europe, during the month of October and dried, to be given as fodder to the sheep in winter.'

The Black Poplar is trimmed in Italy for the vines to run on. They poll or head the trees every second year, sparing the middle straight and most thriving shoot, and at the third year cut that off also.

The shade of this tree is esteemed very wholesome in summer, but it does not become walks or avenues by reason of the suckers, and that it fouls the ground at the fall of the leaf. It should be planted in woods, and to flank places at a distance, for its increase, and the glittering brightness of the foliage.'

Mr. Evelyn mentions divers stately trees on the banks of the Po, as he passed down that river towards Ferrara; but probably these were the Po or Lombardy Poplar, which was not then distinguished from the common sort; though it is remarkable that he should not observe the difference in the manner of growth.

The Poplar will flourish on almost any soils, and the large thick leaves full of rich sweet juice fall in such abundance, as soon to create a soil fit for meadow or pasture. Thus tracts of waste land, not dry, might in a few years be rendered fertile.

In Kamtchatka, the inhabitants are sometimes reduced to the necessity of converting the inner bark into bread.

Scheffer made paper from the cotton down of the seeds.

The buds both of this and the White Poplar, smell very pleasantly early in the spring, and being pressed between the fingers yield a balsamic resinous substance, which extracted by spirits of wine smells like storax.

In the celebrated district of Wase in Flanders, the whole of which is distributed into small inclosures not more than an acre and half in extent, great quantities of White and Black Poplars are planted in the hedge-rows, sixteen or eighteen feet asunder; they are not suffered to grow to any great size, but are cut down every twenty or four and twenty years, and replaced by young plants of the same sort: the largest trees are always cut down, to prevent the land from being too much

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[1] Silva, b. i. c. 14. [2] Kent, Hints 180. [3] Young's Annals, n. 121. p. 64.
[4] Marshall, Midland 2. 387. [5] Evelyn. [6] Withering.
[7] Mem. d'Agriculture, Paris 1786. [8] Evelyn.

shaded. Fifty trees are allowed to an acre, and they are generally sold for seven or eight florins apiece, for making wooden shoes, of which they not only send a prodigious quantity into other provinces, but likewise supply all Holland with them.*

The Black Poplar is a native of Europe, from Sweden to Italy; near rivers and in moist woods.

Species 4. *Lombardy Poplar Tree.* (Populus Dilatata.)

The Lombardy, Turin, or Po Poplar differs from the common Black sort chiefly in its close conical manner of growth, like the Cypress. The leaves are greater in breadth than length, whereas in the Black Poplar the longitudinal diameter is the greatest.

This has been esteemed by some as no more than a variety of that; and indeed it can scarcely be considered as a distinct species.

It is recommended for the quickness of its growth. A correspondent in the Gentleman's Magazine (Vol. LVII. p. 886.) mentions a tree of this sort, not planted much more than ten years, forty feet high at least, and four feet or more in girt, which has gained for the last three years from three to four inches each year in thickness, and has made shoots near four feet long. As it does not flame readily when burnt, he thinks it might be useful for beams and floors of houses; but he has been informed that it decays near the ground in a few years, that the wood is not durable, and that the young shoots are apt to die in hard weather.

Mr. Boutcher observes, that it grows even faster than the common sorts, is propagated with equal facility by cuttings, and is as hardy, and will succeed in the same kinds of land.

A correspondent in Young's Annals asserts, that the Italian Poplar is fit to cut for building uses in twelve years, and that at eight years growth they are forty feet high. For rafters, small beams, studs, boards, &c. he says, they have stood sixteen years without the least decay, having been brushed over with oil, tar, and brickdust, laid on hot.

Dr. Anderson, who recommends it to be tried for live fences, says that he has lately met with some facts, that seem to show that the Lombardy Poplar is not such an exceeding quick grower, or so valuable a tree in other respects, as we were made to believe when it was first introduced into Great Britain.†

The quickness of growth depends upon the soil and situation in which it is planted. Mr. Young, in his Irish Tour, mentions some which grew to the height of thirty-five feet in five years, and many at two years old were of twelve feet. I have measured one of my own trees, which has been planted about twenty-five years, and find that it measures six feet five inches round, a foot above the ground, and six feet, at the height of five feet; it is sixty-three feet five inches high, and has not increased so much in height as in girt, for some years past.

For timber it seems to be inferior to the common Black Poplar, but it may answer tolerably well for floors and other purposes where it is not exposed to the weather, and may prove a useful substitute for deal.

Mr. Songa, his Imperial Majesty's Consul here, suggests, that although the Po or Pine-Poplar, as he calls it, seems regarded in this country only for its beauty and quick growth, yet in a trading country like ours it may be of some consequence in packing all sorts of dry goods. The great quantity therefore planted of late years in the neighbourhood of London may in a short time turn to good account for that purpose.

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* Young's Annals, 15, 434. † Essays, 1. 100.

The trunk of a Po Poplar about two feet in diameter, and thirty feet in length, which size it will attain in twenty years or less, is sold in Lombardy to the dealers for twelve or fifteen shillings. They cut it at the water saw mills, green, into thin boards of one quarter or one third of an inch, for packers of bales of woollens, boards to put in the middle of silk pieces or other manufactures, and for many other uses where a thin board is wanted. Boards of half an inch, and planks from one to two or three inches, are also cut out for different uses; but of about three quarters to an inch mostly, for boxes and cases to pack merchandise in.

The lightness of the wood saves much expense in the carriage: and nails do not split the Poplar plank, as it frequently happens with boxes and cases made of other wood. The Poplar gives way to the nail, and closes upon it afterwards. If cases fall or are thrown carelessly on the ground, which too often happens, this wood gives way a little, and returns to its former position without splitting: which oak and other heavy woods will not do.

In Lombardy, all the vessels in which the grapes are carried home in carts from the vineyards, are of Poplar plank about two inches thick, and in them the grapes are squeezed. Such vessels last thirty or forty years, and by their lightness are manageable, however large and long. A four-wheeled cart is in general covered with one of them, and it contains about fifteen hundred weight of grapes, each hundred being a hundred pound of thirty ounces.*

The peculiar use of the Lombardy Poplar in this country has hitherto been for ornamental plantations and covering unsightly buildings. To the latter purpose its upright close conical mode of growing, with its feathering very readily down to the very ground, particularly adapts it.

Mr. Gilpin has thought some of the Poplars picturesque. They are at least stately trees, but their thin quivering foliage is neither adapted to catch masses of light, like the Elm, nor has it the hanging lightness of the Ash. Its chief use in landscape is to mix as a variety, in contrast with other trees.

The conic form of the Lombardy Poplar, as a deciduous tree, is peculiar. Among evergreens we find the same character in the Cypress; and both trees in many situations have a good effect. The Cypress often, among the ruins of ancient (and the buildings of modern) Rome, breaks the regularity of a wall, or a pediment: and the Poplar on the banks of the Po, no doubt has the same effect among the deciduous brethren, by forming the apex of a clump.

One beauty the Italian Poplar possesses which is almost peculiar to it; and that is the waving line it forms, when agitated by wind. Most trees in this circumstance are partially agitated. One side is at rest, while the other is in motion. But the Italian Poplar waves in one simple sweep from the top to the bottom, like an ostrich-feather on a lady's head. All the branches coincide in the motion: and the least blast makes an impression upon it, when other trees are at rest. Although this tree sometimes has a good effect, when standing single; it generally has a better, when two or three are planted in a clump.†

The Lombardy Poplar is said to have been first introduced into this country, in Essex, by the Earl of Rochford, about the year 1758, and in that county it goes by his name.‡ In France it has been cultivated since the year 1749.§

Species 5. *Common Tacamahaca Poplar.* (Populus Balsamifera.)

By the growth of this tree in Europe it seems not to be of a very large size. Bark smooth, like

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* Young's Annals, 4. p. 7.
† Forest Scenery, 1. 53.
‡ Gent. Mag. 57. 886. and Hort. Kew.
§ Memoirs d'Agriculture.

that of the Black Poplar; the young branches have much the same appearance, but their annual shoots are seldom more than a foot in length. The leaves resemble those of the Pear-tree; are about four inches long, and an inch and half broad in the middle, drawing towards a point at each end; their upper side is of a deep green; and their under side is hoary; they stand upon long footstalks, and are placed without order upon the branches. These flowers appear in July, and are succeeded by oval capsules terminating in a point, and inclosing downy seeds. The scaly covers of the buds abound with a tenacious balsam in the spring, becoming liquid by heat. It is of a yellowish colour and has a fragrant scent.

This tree is a native of Canada, and some other parts of North America, whence the balsam was brought to Europe. It comes over in shells, and is smooth, of an even texture, and in colour like strained Galbanum, but lighter.

From Canada it was brought to the island of Jersey, and was propagated there. Six of the plants were sent from thence to Caroline Queen consort of King George II, in the year 1731, by the title of *Arbre de la Reine*. One of these was given by the Queen to Sir Hans Sloane, and was planted in the botanic garden at Chelsea. This produced male katkins several years, but produced none of the female or bisexual flowers until the year 1760 or thereabouts. It does not appear that this tree has been long in France: for Mons. Duhamel mentions it to have been lately planted there, and that it had supported the winter of 1754, which had killed many other trees.*

Mr. Miller's figure and description agree with the American Tacamahaca as it appears in our gardens. The former represents the male aments: it has much wider leaves; but he adds a leaf of a Daurian variety with a longer ovate leaf, more like ours; and of an Altaic variety, with a lanceolate leaf.

The trunk of the tree in Siberia is straightish, not tall, covered with an ash-coloured bark; the wood reddish, closer and a little harder than in the common Poplars. The branchlets in the Altaic tree are more slender, and rod-like; in the Daurian thick, short, knobbed and wrinkled, with a yellow skin sometimes of a very deep colour. Leaves in the rod-like variety ovate-acuminate, in the Altaic commonly lanceolate; in the common Daurian ovate and thicker, so as to be in a manner coriaceous; in both very sharp, serrate, quite smooth, shining as if varnished, deep green above, pale underneath. Aments terminating, thick, the female ones ripening in June; containing ovate thick rugged capsules, subcalycled with the receptacle, scarcely peduncled.

The buds of this tree, from autumn to the leafing season are covered with abundance of a glutinous yellow balsam, which often collects into drops, and is pressed from the tree for medical use. It dissolves in spirits of wine; and the inhabitants of Siberia prepare a medicated wine from the buds, which is diuretic, and esteemed by them serviceable in the scurvy. The Grous and other birds of that family feeding on these buds during winter, acquire a flavour which is much esteemed in that country.

This tree occurs first, in Siberia, in the upper region of the river Irtis, by the Uba, Ulba, and other streams of the Altaic chain. It is more abundant in eastern Siberia, especially in the channels of the Jenisea Daurian rivers. On gravelly banks it grows to a considerable size, but with a short trunk; in subalpine situations it is taller; in the moist plains of Dauria it is shrubby, because the grass is fired there, and the twigs of the former year being thus destroyed, it cannot rise into a trunk.†

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* Miller's Figures. † Pallas, Ross.

Species 6. *Heart-leaved Tacamahaca Poplar Tree.* (POPULUS CANDICANS.)

This also is native of Canada, and is resinous like the preceding; but the leaves are different, being hollowed next the petiole and drawn out at the point. It flowers earlier, namely in March. Introduced about 1772, by John Hope, M. D.*

Species 7. *Smooth Poplar Tree.* (POPULUS LÆVIGATA.)

Native of North America. Cultivated in 1769, by Hugh Duke of Northumberland. It flowers in March and April.

Species 8. *Canadian Poplar Tree.* (POPULUS MONILIFERA.)

Native of Canada; introduced about 1772 by John Hope, M. D. It flowers in May.†

Species 9. *Athenian Poplar Tree.* (POPULUS GRÆCA.)

This resembles the next species in growth and foliage.—Native of the islands of the Archipelago. Cultivated in 1779, by Hugh Duke of Northumberland. It flowers in March and April.

Species 10. *Various-leaved Poplar Tree.* (POPULUS HETEROPHYLLA.)

A large tree; branches numerous, veined and angular; leaves broad and slightly serrate: flowers in loose aments, making little show.—Native of Virginia and New York. Cultivated in 1765 by John Fothergill, M. D. It flowers in April and May.‡

Species 11. *Carolina Poplar Tree.* (POPULUS ANGULATA.)

Shoots very strong, and is covered with a light green bark like some sorts of Willow. The leaves upon young trees, and also upon the lower shoots are very large; but those upon older trees are smaller: as the trees advance their bark becomes of a lighter colour, approaching to grey. The aments are like those of the Black Poplar; and the anthers are purple. It grows naturally in Carolina, where it becomes a very large tree. I have seen some of a very considerable size in England. It was cultivated by Mr. Miller in 1759; and flowers in March.‡

CULTURE.

These trees may be propagated either by layers or cuttings, which will readily take root, as also from suckers, which the white Poplars send up from their roots in great plenty; but these are less valuable than those propagated by cuttings, being more liable to send up suckers. The best time for transplanting these suckers is in October, when their leaves begin to decay. These may be placed in a nursery for two or three years to get strength, before they are planted out where they are designed to remain; but if you intend to propagate them from cuttings, it is better to defer the doing of that until February, at which time you may plant truncheons of two or three feet long, thrusting

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* Hort. Kew. † Idem. ‡ Idem.

them about a foot and a half into the ground. These will readily take root, and if the soil be moist in which they are planted, they will arrive to a considerable bulk in a few years.

The Black Poplar is not so apt to take root from large truncheons, therefore it is the better method to plant cuttings about a foot and a half in length, thrusting them a foot deep into the ground; these will take root very freely, and may be afterward transplanted where they are to remain. This sort will grow upon almost any soil, but will thrive best in moist places.

I have planted cuttings of this tree, which in four years have been bigger in the trunk than a man's thigh, and near twenty feet in height, and this upon a very indifferent soil; but in a very moist soil, it is common for these trees to shoot eight or ten feet in a season; so that where a person hath a mind to make a shelter in a few years, there is scarce any tree so proper for that purpose as this; but they should not be planted too near the pleasure-garden, because the katkins and down which fall from these trees, will make a prodigious litter in the spring.

The white sorts, as also the Aspen-tree, likewise cause a great litter in the spring, when their katkins and down fall off; and their roots being very apt to produce a large quantity of suckers, they are unfit to be planted near a house or garden; but when they are interspersed with other trees in large plantations, they afford an agreeable variety, their leaves being white on their under sides, which, when blown with the wind, are turned to sight.

A considerable advantage may be made by planting these trees upon moist boggy soils, where few other trees will thrive. Many such places there are in England, which do not at present bring in much money to their owners; whereas, if they were planted with these trees, they would, in a very few years, over-purchase the ground, clear of all expence; but there are many persons, who think nothing except Corn worth cultivating in England; or if they plant timber, it must be Oak, Ash, or Elm; and if their land be not proper for either of these, it is deemed worth little; whereas if the nature of the soil was examined, and proper sorts of plants adapted to it, there might be very great advantage made of several large tracts of land, which at this time lie neglected.

Spring is the best season for planting the cuttings; though they will grow if planted in any of the winter months. They should all be vigorous shoots of the last year, or at least not older than two years; a foot and half in length. Plant them ten inches or a foot in the ground, in rows two feet and a half or a yard asunder, and a foot or eighteen inches from each other. Look over the plants in summer, to nip off all side shoots. In two years they may be planted out, if they are for small woods or spinneys, in boggy or watery grounds. If they are for standards, they may remain in the nursery another year; and when planted out, they will be worth in twenty or thirty years as many shillings each.

The Tacamahacca sends up a great number of suckers from the roots, by which it multiplies in plenty, and every cutting which is planted will take root; so that when a plant is once obtained, there may soon be plenty of the plants raised.

The cuttings should be planted the middle of February, in rich mellow earth, shaded from the mid-day sun, and watered in dry weather. The succeeding February remove them; smooth the extremities of their roots, cut off the strong side branches, and plant them in rows three feet distant, and eighteen inches asunder in the row: here let them continue two or three years, when they may be transplanted to the places where they are intended to remain.

It will grow on almost any soil; and when there are void spaces in plantations, occasioned by the death of other trees, this will sooner and better supply their places than most others.*

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* Boutcher.

The Carolina Poplar may also be propagated by cuttings or layers; the latter is generally practised by the nursery gardeners, being the surest method; and those plants are not so full of moisture as those raised by cuttings, so are less liable to be cut down by the frost when young: as they are very apt to be, to a considerable length. As the trees grow older, the shoots are more woody, and not so liable to this disaster. They should however be planted in a sheltered situation, for their leaves being very large, the wind has great power over them; and the branches, being tender, are frequently broken or split down by the wind in summer, where they are much exposed.

As these trees are very vivacious like the willow, and some other aquatic trees, there is no occasion to trouble ourselves about their propagation by means of seeds.

Genus 32. Prunus, *Cherry Plumb.* Class XII. Icosandria. Order I. Monogynia.

Species 1. *Common Bird-Cherry Tree.* (Prunus Padus.)

The common Bird Cherry rises to the height of ten or twelve feet, and if permitted to stand, will have a trunk of nine or ten inches in diameter. The branches grow wide and scattering, and are covered with a purplish bark. Leaves ovate-lanceolate, alternate, slightly serrate. Flowers in long loose bunches from the side of the branches. Petals white, much smaller than those of the Cherry. Flowers ranged alternately, each on a small pedicel: they have a strong scent, which is very disagreeable to most persons. They appear in May, and are succeeded by small roundish fruit, at first green, afterwards red, but when ripe black; inclosing a roundish furrowed stone or nut, which ripens in August.

Withering observes, that the calyx is finely serrated as well as the petals, and at the bottom within is beset with numerous woolly hairs, and that the stamens are twenty-five in number.

Native of most parts of Europe, in woods and hedges; also in all the northern and temperate part of Russia and all Siberia. Common in the north of England, as about Ingleborough in Yorkshire, in woods by the Tees, at Pendeford in Staffordshire, a few miles north of Manchester. In some parts of Norfolk, as about Watton and Dereham. In a lane between Temple Mills and Epping Forest. Frequent in Scotland, in woods.

The Bird Cherry, called in Scotland Hag-berry, which is commonly propagated in the nurseries as an ornamental tree or shrub, grows well in woods, groves or fields, but not in a moist soil. It bears lopping, and suffers the grass to grow under it. The fruit is nauseous, but bruised and infused in wine or brandy, it gives them an agreeable flavour.

The wood being smooth and tough, is made into handles for knives and whips. Sheep, goats, and swine, eat it, cows are not fond of it, horses refuse it.* The berries are much sought after by birds, and though very nauseous are eaten by children in some places.† In Scotland they drink an infusion of them in brandy.‡

Species 2. *Cornish Bird-Cherry.* (Prunus Rubra.)

The Red Bird Cherry, commonly called in the nursery gardens about London the Cornish Cherry,

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* Withering. † Raii Hist. & Linn. Suec. ‡ Lightfoot.

has been confounded with the preceding, but when raised from seed it always retains a difference. It rises with a straight upright stem more than twenty feet high; the branches are shorter, and closer together than those of the first, and naturally form a regular head. The leaves are shorter and broader, and not so rough. The flowers grow in closer shorter spikes, standing more erect. The fruit is larger, and red when ripe. It flowers a little later than the first sort, namely in May and June; and the fruit ripens in August.

Mr. Miller says it grows naturally in Armenia, whence he received the seeds: its native place, however, is doubtful. It appears from Furber's catalogue, that it was cultivated here in 1724.*

Species 3. *Common American Bird-Cherry Tree.* (Prunus Canadensis.)

This rises with a thick stem from ten to thirty feet high, dividing into many branches, which have a dark purple bark. Leaves ovate, alternate, on short foot-stalks, of a lucid green, slightly serrate, and continuing in verdure as late in the autumn as any of the deciduous trees. The fruit is larger than that of the preceding, is black when ripe, and is soon devoured by birds. The wood is beautifully veined with black and white, and will polish well; it is therefore frequently used for cabinet work; as is also the first sort, particularly in France, where it is called *Bois de Sainte Lucie.*

According to Linnæus, this is the offspring of the common Bird Cherry, but the warts on the branches are double the size. There are two pairs of glands at the top of the petiole in front. The leaves are less netted underneath and almost smooth. The petals are orbicular, not obovate. The fruit is four times as big; not red, as Linnæus says it is, but, like the common sort, first green, then red, and finally black.†

Parkinson calls it the Virginian Cherry Bay. It is a native of Virginia and other parts of North America, and was cultivated here in 1629, as appears from Parkinson's Paradisus.‡

Species 5. *Perfumed Cherry-tree.* (Prunus Mahaleb.)

Branches even. Leaves less rigid than in the others, finely serrate, green on both sides, but manifestly villose to the touch, and ending in the petiole at the base. Native of North America.§

This is a low crooked tree. The wood is red, very hard, and sweet-scented. Leaves wide and pointed, approaching to those of the wild Pear. Flowers white. Fruit black, yielding a bitter purple juice, the stain of which is not easily effaced; the stone is smooth, round, and a little flatted on the sides; inclosing a bitter perfumed kernel.‖ Birds are very fond of this fruit. A fragrant and pleasant distilled water is made from leaves and flowers.¶

The wood, on account of its agreeable odour, is greatly esteemed by the French for making cabinets and other furniture. This and the wood of the Bird Cherry is the true sort. Villars however calls the Mahaleb by this name.

Native of Germany, Switzerland, Austria, the South of France, and Piedmont, Crim Tartary and every where on Caucasus. Cultivated in 1714 by the Duchess of Beaufort. It flowers in April and May. Ray calls it Rock Cherry.

Gerarde says, that "the fruit is as hard as a bead of corall, somewhat round and of a shining black colour, which the cunning French perfumers do bore through, making thereof bracelets, chains,

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* Hort. Kew. † Du Roi. ‡ Hort. Kew.
§ Linn. Spec. ‖ Villars. ¶ Krocker.

and such like trifling toys, which they send into England smeared over with some odd sweet compound or other, and here sold unto our curious ladies and gentlewomen for rare and strange Pomeambers, for great sums of money."

Species 6. *Cultivated Cherry Tree.* (Prunus Cerasus.)

The Common Cherry-tree has ash-coloured, shining, roundish branches. Leaves petioled, ovate or ovate-lanceolate, acuminate, unequally serrate, veined; the younger ones folded together flat and more or less pubescent underneath. Stipules toothed, glandular. Umbels leafless, few-flowered, nodding. Calyx reflex. Petals white. Drupe red, acid.*

Leaves biglandular; leafing and flowering buds distinct, the former terminating, the latter from the side of the branches; stamens more than twenty-four or near thirty. It differs from the plum in having the stone nearly globular, with the kernel of the same shape.†

Native of Asia and Europe. It derives the Greek names Κερασος and Κερασια, the Latin *Cerasus*, and the modern names *Cherry*, *Cerister*, &c. from a town in Pontus called Cerasus, whence Lucullus is said to have introduced it into Italy, after he had subdued Mithridates. This however must be understood of the cultivated Cherry; for the tree in its wild state was in Europe antecedent to the time of Lucullus.‡

The Cherry loves a sandy soil and an elevated situation. The gum that exudes from it is equal to Gum Arabic. Hasselquist relates, that more than one hundred men, during a siege, were kept alive for near two months, without any other sustenance than a little of this gum taken sometimes into the mouth, and suffered gradually to dissolve. The wood is hard and tough, and used by the turner, and for making chairs, being stained to imitate mahogany. It is the original stock from which most of the cultivated sorts are derived.

Mr. Miller's list contains:

1. The common or Kentish Cherry, from which he says it is supposed most of the varieties cultivated in the English gardens have been raised; though he is very doubtful of it; the differences in the size and shape of their leaves, and in the shoots of the trees being very great.

2. The early May Cherry, which is the first ripe, and therefore a place may be given it where there is room.

3. The May Duke. This ripens next: it is a larger fruit, and more valuable.

4. The Archduke comes after the May Duke, and if permitted to hang till it is ripe, is an excellent Cherry. It should not be gathered before Midsummer, and may hang a fortnight longer, even near London, where it ripens a fortnight sooner than in places forty miles distant. Against a north wall this fruit may be continued till August.

5. The Flemish.

6. The Red Heart.

7. The White Heart.

8. The Black Heart.

9. The Amber Heart.

10. The Ox Heart.

11. The Lukeward. A good bearer, and a very good fruit, of a dark colour, and will do well in standards.

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* Smith. † Scop. & Haller. ‡ Ray Hist.

12. The Carnation. Valuable for coming late: very firm and fleshy, but not the best bearer: it will ripen very well on espaliers.

13. The Hertfordshire Heart: firm and well flavoured; does not ripen earlier than the end of July or the beginning of August.

14. The Morello: generally planted against a north wall, and used for preserving; but in a better aspect, and suffered to hang till ripe, is a very good fruit for the table. On a S. W. wall the fruit will ripen perfectly by the middle of August.

15. The Bleeding Heart.

16. The large Spanish Cherry, nearly allied to the Duke, of which it seems to be only a variety, and ripens soon after it.

17. The yellow Spanish Cherry; of an oval shape and an amber colour: it ripens late, is sweet but not of a rich flavour, and is but a middling bearer.

18. The double-flowered, propagated solely for ornament.

Other varieties are continually adding to these, differing little from the preceding, as—

19. Harrison's Duke Cherry.

20. Crown Heart Cherry.

21. Turkey, &c.

It is commonly asserted that Cherries were introduced into England in the time of Henry VIII. Mr. Gough, in his topography, says it is supposed that they were brought from Flanders into Kent by Richard Haines, fruiterer to that monarch. But we certainly had them sooner. We have no proof indeed that England was indebted to the Romans for Cherries and other fruits of warmer climates; or that they were here at the time of the Norman conquest, or during some centuries after it. A diligent and ingenious antiquary has however discovered written evidence which clearly shows, that before the middle of the fifteenth century, the hawkers in London were wont to expose Cherries for sale in the same manner as is now done early in the season. Lydgate, in the following lines from his poem called *Lilpenny*, cited by Mr. Warton, in the History of English Poets, Vol. II. p. 307, says

> " Hot pescode own (one) began to cry,
> " Strawberys ripe, and cherries in the ryse."

That is, remarks Mr. Warton, he cried hot peas, ripe strawberries, and cherries on a *bough* or twig: *rice* or *ris*, being properly a long branch, and the word is still so used in the west of England.

The tradition therefore respecting Haines's having originally planted Cherry-trees at Teynham, may either mean that he was the first person who reared a Cherry orchard, or that he first introduced some particular Cherry, perhaps that which we call the Flemish Cherry,* if we had it not earlier.

It is indeed extremely improbable, considering the magnificence of the times, and our intimate connection with France and Flanders, from the conquest to the destructive contentions between the houses of York and Lancaster, that we should not have imported such fruits as would bear our climate from those countries, unless they had been left us by the Romans.

The above passage from Lydgate carries the written evidence for the cultivation of Strawberries higher than that which has been given by Stow and Shakspeare. What is meant by *hot peas?* Surely not hot grey peas, which were commonly cried about London during winter even in this century; for they were in a dry state, and the poet would not have called them *pescodes*, nor would he have joined them with strawberries and cherries. He probably intended what we now call *Hotspur* peas.

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* Gent. Mag. for 1786. 1. 389. Signat. W. & D.

Species 7. *Small-fruited Cherry Tree.* (Prunus Abium.)

The Black Cherry is supposed to be a native of England. It grows to be a large tree, fit for timber, and is frequently found growing as such in the woods. From this the only varieties which I have ever known raised by seeds, are the Black Coroun, and the small Wild Cherry; of which there are two or three varieties, differing in the size and colour of the fruit.

The wild Cherries are proper to plant in parks, because they grow to a large size and make beautiful trees. In spring, when they are in flower, they are very ornamental; the fruit is good for birds; and the wood is very useful for turners. These trees will thrive in poor land better than most other sorts. The French often plant them for avenues to their houses, on poor land; they also cultivate them in their woods, to cut for hoops.

The stones are generally sown for raising stocks, to graft or bud other Cherries upon, being of quicker growth and of longer duration.

The garden Cherry grows only about fifteen or twenty feet high, whereas this attains forty or fifty feet in height, with a more erect and lofty head.

The common Black Cherry is much cultivated in the Chiltern part of Buckinghamshire, and makes a beautiful appearance in the spring, when the trees are in blossom at the same time that the Beech is leafing. In Suffolk it abounds about Polstead, and is commonly called the Polstead Cherry. In that county the wild Cherries are called *Merries*, from the French *Merise*. The *Corone* or *Coroun* Cherry, which is the highest improvement of this, is common in Hertfordshire and about Bergh-Apton in Norfolk.

After all, I can scarcely think that the *Prunus avium* is specifically distinct from the *Prunus Cerasus*.

The former grows to a considerable size: Mr. Evelyn mentions one that held above eighty-five feet in height; it is then fit to make chairs and stools with, cabinets, tables, especially the redder sort, which will polish well; also pipes and musical instruments.

Species 8. *Pensylvania, or Upright, Cherry Tree.* (Prunus Pensylvania.)

This has the appearance of *P. Cerasus*, but the branchlets have whitish dots scattered over them, as in *P. virginiana*. Flowers smaller than those of *P. Cerasus*.* Native of North America. Introduced in 1773, by Messrs. Kennedy and Lee. It flowers in May.†

Species 9. *Canadian Black Cherry Tree.* (Prunus Nigra.)

Leaves ovate, much acuminate, unequally and sharply serrate, smooth on both sides. Umbels three or four-flowered.‡ Native of Canada. Introduced 1773, by Messrs. Kennedy and Lee. It flowers in April and May.§

Species 10. *Common Plum Tree.* (Prunus Domestica.)

The common Plum-tree is of a middling size, growing to the height of fifteen or twenty feet, branching into a moderately-spreading head. Leaves on short petioles, which have one or two glands

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* Linn. Suppl. † Hort. Kew. ‡ Willdenow.
§ Hort. Kew. ‖ Smith. ¶ Gærtner.

towards the end; they are slightly serrate and smooth; when young they are convoluted or coiled, and pubescent underneath. Peduncles short, commonly solitary. Calyx erect. Petals white, obovate.* The drupe is an oblong spheroid, swelling a little more on one side and there grooved, of a blue colour, with a bloom on it: pulp yellowish, tender. Shell bony, ovate, pointed at both ends, compressed, obscurely excavated; having two longitudinal sutures, one more gibbous, simple, acute, the other straighter, dividing, narrow, crenulate.†

It loves a lofty exposure, and is favourable to pasturage. The bark dyes yellow. The cultivated garden Plums are all derived from this species.

It is a native of Asia and Europe; perhaps scarcely of Britain, though it is not uncommon in our hedges, but it probably originated from the seeds of some of the cultivated species: which according to Pliny came from Syria into Greece, and thence into Italy.

The varieties of garden and orchard Plums are very numerous, differing in the form, taste, colour and substance of the fruit. Parkinson's catalogue contains sixty sorts, fit, as he says, for an orchard, to be stored with good fruit: all which sorts, adds he, are to be had of my very good friend, Master John Tradescante, who hath wonderfully laboured to obtain all the rarest fruits he can hear of in any place of Christendom, Turkey, yea or the whole world.

Mr. Miller has given thirty varieties of this fruit, which are cultivated in the English gardens.

1. Prunus (*Jannehâtive, Duham, n.* 1. *t.* 1.) fructu parvo præcoci. *The white Primordian.* This is a small, longish, white Plum, of a clear yellow colour, covered over with a white flue, which easily wipes off. It is a pretty good bearer, and, for its coming very early, one tree may have a place in a large garden of fruit, but it is mealy, and has little flavour. This ripens the middle or latter end of July.

2. Prunus (*Damas Noir*) fructu magno crasso subacido. Tourn. *The early Damask, commonly called the Morocco Plum.* This is a middle sized Plum, of a round shape, divided with a furrow in the middle (like Peaches.) The outside is of a dark black colour, covered with a light violet bloom; the flesh is yellow, and parts from the stone. It ripens the end of July, and is esteemed for its goodness.

3. Prunus (*Petit Damas*) fructu parvo dulci atro-cæruleo. Tourn. *The little black Damask Plum.* This is a small black Plum covered with a light violet bloom. The juice is richly sugared; the flesh parts from the stone, and it is a good bearer. Ripe the beginning of August.

4. Prunus (*Gros Damas, Duham. n.* 2.) fructu magno dulci atro-cæruleo. Tourn. *Gros Damas Violet de Tours, i. e. great Damask Violet of Tours.* This is a pretty large Plum, inclining to an oval shape. The outside is of a dark blue covered with a violet bloom; the juice is richly sugared; the flesh is yellow, and parts from the stone. Ripe in August.

5. Prunus (*Orleans*) fructu roundo atro rubente. *The Orleans Plum.* The fruit is so well known to almost every person, that it is needless to describe it: it is a very plentiful bearer, which has occasioned its being so generally planted by those persons who supply the markets with fruit, but it is an indifferent Plum. It ripens in August.

6. Prunus (*Fotheringham*) fructu oblongo atro-rubente. *The Fotheringham Plum.* This fruit is somewhat long, deeply furrowed in the middle. The flesh is firm, and parts from the stone; the juice is very rich. This ripens in August.

7. Prunus (*Perdigron*) fructu nigro, carne durâ. Tourn. *The black Perdigron Plum.* This is a middle-sized Plum of an oval shape. The outside is of a very dark colour, covered over with a violet

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* Smith. † Gærtner.

bloom; the flesh is firm, and full of an excellent rich juice. This is greatly esteemed by the curious. Ripe in August.

8. Prunus (*Perdigron violet, Duham. n.* 21. *t.* 9.) fructu magno è violaceo rubente suavissimo saccharato. Tourn. *The Violet* or *blue Perdigron Plum.* This is a large fruit, rather round than long, of a bluish red colour on the outside. The flesh is of a yellowish colour, pretty firm, and closely adheres to the stone; the juice is of an exquisite rich flavour. This ripens in August.

9. Prunus (*Perdrigon blanc, Duham. n.* 20. *t.* 8.) fructu ovato ex albo flavescente. *The white Perdigron Plum.* This is a middling Plum, of an oblong figure. The outside is yellow, covered with a white bloom; the flesh is firm, and well tasted. It is a very good fruit to eat raw, or for sweetmeats, having an agreeable sweetness mixed with an acidity. It ripens the end of August.

10. Prunus (*Impériale, Duh. n.* 32, *t.* 15.) fructu ovato magno rubente. Tourn. *The red Imperial Plum*, sometimes called *the red Bonum Magnum.* This is a large oval-shaped fruit, of a deep red colour, covered with a fine bloom. The flesh is very dry, and very indifferent to be eaten raw, but is excellent for making sweetmeats; this is a great bearer. Ripe in September.

11. Prunus (*Impériale blanche, Duh. n.* 35.) fructu ovato magno flavescente. Tourn. *White imperial Bonum Magnum, white Holland, Mogul* or *Egg Plum.* This is a large oval-shaped fruit, of a yellowish colour, powdered over with a white bloom. The flesh is firm, and adheres closely to the stone; the juice is of an acid taste, which renders it unpleasant to be eaten raw, but it is very good for baking or sweetmeats. It is a great bearer, and is ripe the middle of September.

12. Prunus (*Cheston*) fructu ovato cæruleo. *The Cheston Plum.* This is a middle-sized fruit of an oval figure. The outside is of a dark blue, powdered over with a violet bloom; the juice is rich, and it is a great bearer. Ripe the middle of September.

13. Prunus (*Apricotée, Duh. n.* 28. *t.* 13.) fructu maximo rotundo flavo & dulci. Tourn. *Prune d' Abricot, i. e. the Apricot Plum.* This is a large round fruit of a yellow colour on the outside, powdered over with a white bloom. The flesh is firm and dry, of a sweet taste, and comes clean from the stone. This ripens the end of September.

14. Prunus (*Maître Claud*) fructu subrotundo, ex rubro & flavo mixto. *The Maître Claud.* Although this name is applied to this fruit, yet it is not what the French so call. This is a middle-sized fruit, rather round than long, of a fine mixed colour between red and yellow. The flesh is firm, parts from the stone, and has a delicate flavour. Ripe the end of September.

15. Prunus (*Diaprée*) fructu rubente dulcissimo. Tourn. *Rochecorbon, Diaprée rouge, Duh. n.* 37. *t.* 20. *f.* 12. This is a large round fruit, of a reddish colour, powdered over with a violet bloom; the flesh adheres closely to the stone, and is of a very high flavour. Ripe the end of August.

16. Prunus fructu rotundo flavescente. *La petite Reine Claude, Duh. n.* 26. This is a small round fruit, of a whitish yellowish colour, powdered over with a pearl-coloured bloom; the flesh is firm and thick, quits the stone, and its juice is richly sugared. Ripe the end of August.

17. Prunus fructu rotundo nigro purpureo majori dulci. Tourn. *Myrobalan Plum, Duh. n.* 46. *t.* 20. *f.* 15. This is a middle-sized fruit, of a round shape; the outside is a dark purple, powdered over with a violet bloom; the juice is very sweet. It is ripe the end of August.

18. Prunus fructu rotundo è viridi flavescente, carne duro suavissimo. *La grosse Reine Claude*, or *Dauphine, Duh.* 25. *t.* 11. At Tours it is called Abricot vert; at Rouen, verte bonne; and in other places, Damas vert, or Tromp-valet. This is one of the best Plums in England; it is of a middle size, round, and of a yellowish green colour on the outside; the flesh is firm, of a deep green colour, and parts from the stone; the juice has an excellent rich flavour, and it is a great bearer. Ripe the middle of September. This Plum is confounded by most people in England, by the name of Green Gage; but this is the sort which should be chosen, although there are three or four different sorts of Plums

generally sold for it, one of which is small, round, and dry; this quits the stone, and is later ripe, so not worth preserving.

19. Prunus fructu amygdalino. Tourn. *Rognon de Coq.* This is an oblong fruit, deeply furrowed in the middle; it is of a whitish colour on the outside, streaked with red; the flesh of it adheres firmly to the stone, and it is late ripe.

20. Prunus fructu rotundo flavo dulcissimo. *Drap, d'Or, i. e. the Cloth of Gold Plum, Duham. n.* 30. This is a middle-sized fruit, of a bright yellow colour, spotted or streaked with red on the outside; the flesh is yellow, and full of an excellent juice. It is a plentiful bearer, and ripens about the middle of September.

21. Prunus fructu cerei coloris. Tourn. *Sainte Catharine. Duham. n.* 43. *t.* 19. This is a large oval-shaped fruit, somewhat flat; the outside is of an amber colour, powdered over with a whitish bloom, but the flesh is of a bright yellow colour, is dry and firm, adheres closely to the stone, and has a very agreeable sweet taste. This ripens at the end of September, and is very subject to dry upon the tree, when the autumn proves warm and dry. This makes fine sweetmeats, and is a plentiful bearer.

22. Prunus fructu ovato rubente dulci. *The Royal Plum. Duham. n.* 24. *t.* 10. This is a large fruit of an oval shape, drawing to a point next the stalk; the outside is of a light red colour, powdered over with a whitish bloom; the flesh adheres to the stone, and has a fine sugary juice. This ripens the middle of September.

23. Prunus fructu parvo ex viridi flavescente. Tourn. *La Mirabelle. Duham. n.* 29. *t.* 14. This is a small round fruit, of a greenish yellow on the outside; the flesh parts from the stone, is of a bright yellow colour, and has a fine sugary juice. This is a great bearer, ripens the end of August, and is excellent for sweetmeats.

24. Prunus Brigoniensis, fructu suavissimo. Tourn. *Prune de Brignole, i. e. the Brignole Plum.* This a large oval-shaped fruit, of a yellowish colour, mixed with red on the outside; the flesh is of a bright yellow colour, dry, and of an excellent rich flavour. This ripens the middle of September, and is esteemed the best Plum for sweetmeats yet known.

25. Prunus fructu magno è violaceo rubente serotino. Tourn. *Imperatrice, i. e. the Empress. Duham. n.* 39. *t.* 18. This is a large round fruit, of a violet red colour, very much powdered with a whitish bloom; the flesh is yellow, cleaves to the stone, and is of an agreeable flavour. This ripens about the beginning of October.

26. Prunus fructu ovato maximo flavo. Tourn. *Prune de Monsieur, i. e. Monsieur's Plum. Duham. n.* 15. *t.* 7. This is sometimes called the Wentworth Plum. It is a large oval-shaped fruit, of a yellow colour both within and without, very much resembling the Bonum Magnum, but the flesh of this parts from the stone, which the other doth not. This ripens towards the latter end of September, and is very good to preserve, but the juice is too sharp to be eaten raw. It is a great bearer.

27. Prunus fructu majori rotundo rubro. Tourn. *Prune Cerizette, i. e. the Cherry Plum.* This fruit is commonly about the size of the Ox-heart Cherry, is round, and of a red colour; the stalk is long like that of a Cherry, which this fruit so much resembles, as not to be distinguished therefrom at some distance. The blossoms of this tree come out very early in the spring, and being tender, are very often destroyed by cold, but it affords a very agreeable prospect in the spring; for these trees are generally covered with flowers, which open about the same time as the Almonds; so that when they are intermixed therewith, they make a beautiful appearance before many other sorts put out; but by this blossoming so early, there are few years that they have much fruit.

28. Prunus fructu albo oblongiusculo acido. Tourn. *The white Pear Plum.* This is a good fruit

for preserving, but is very unpleasant if eaten raw; it is very late ripe, and seldom planted in gardens, unless for stocks to bud some tender sorts of Peaches upon, for which purpose it is esteemed the best amongst all the sorts of Plums.

29. Prunum Mytellinum. Park. *The Muscle Plum.* This is an oblong flat Plum, of a dark red colour; the stone is large, and the flesh but very thin and not well tasted, so that its chief use is for stocks, as the former.

30. Prunus fructu parvo violaceo. *The St. Julian Plum.* This is a small fruit, of a dark violet colour, powdered over with a mealy bloom; the flesh adheres closely to the stone, and in a fine autumn will dry upon the tree. The chief use of this Plum is for stocks, to bud the more generous kinds of Plums and Peaches upon; as also for the Bruxelles Apricot, which will not thrive so well upon any other stock.

Mr. Miller makes no mention of

31. The Green Gage, unless he intends it by n. 18. It is the finest eating Plum we have, especially when it is tinged with purple, is ripe in August and September, and ripens very well on standards or espaliers.

32. Blue Gage; ripe in September. A middle-sized, roundish, blueish Plum, of a rich flavour.

33. Wentworth; large, oval, yellowish, acid and parting from the stone, used chiefly for tarts and sweetmeats, like n. 10 and 11.

34. Damascene, vulgarly Damson; small, roundish, dark blue, a great bearer; in orchards for the kitchen: ripe in September.

Ornamental varieties are the Double-blossomed; the Gold-striped; the Silver-striped; and the stoneless Plum.

CULTURE.

1, 2, 22. The two first sorts and the twenty-ninth are easily propagated either by seeds or layers. Sow the seeds in the autumn upon a bed or border of good ground, in the same way as Cherry-stones designed for stocks. Treat the plants also in the same manner; planting them out in a nursery, where they may stand two years to get strength; and then transplant them to the places where they are to remain. They are usually intermixed with other flowering-trees and shrubs in ornamental plantations.

For layers, the young shoots should be laid down in the autumn: these will have good roots in twelve months, when they may be separated from the old plants, and transplanted into a nursery for a year or two, to get strength, and may then be removed to the places where they are to grow.

Perfumed Cherry is often propagated by grafting upon any sort of Cherry stock.

All the sorts of Cherries which are usually cultivated in fruit-gardens, are propagated by budding or grafting the several kinds into stocks of the black or wild red Cherries, which are strong shooters, and of a longer duration than any of garden kinds. The stones of the wild Cherries are sown in a bed of light sandy earth in autumn; or are preserved in sand till spring, and then sowed. The young stocks should remain in the nursery beds till the second autumn after sowing; at which time prepare an open spot of good fresh earth, well worked. In October plant out the young stocks at three feet distance row from row, and about a foot asunder in the rows; being careful in taking them up from their seed-beds, to loosen their roots well with a spade, to prevent their breaking. Prune their roots; and if they are inclinable to root downwards, shorten the tap root, but do not prune their tops.

The second year after planting out, if they take to growing well, they will be fit to bud, if they

are intended for dwarfs; but if they are for standards they will not be tall enough till the fourth year, for they should be budded or grafted near six feet from the ground, otherwise the graft will not advance much in height; so that it will be impossible to make a good tree from such as are grafted low, unless the graft be trained upwards.

The usual way with the nursery-gardeners is, to bud their stocks in summer, and such of them as miscarry they graft the succeeding spring. Those trees where the buds have taken, must be headed off the beginning of March about six inches above the bud; and when the bud has shot in summer, if there be any apprehension of its being blown out by the winds, it must be fastened with bass or other soft tying to that part of the stock which was left above the bud. The autumn following these trees will be fit to remove; but if the ground be not ready to receive them, they may remain two years before they are transplanted; in doing which observe not to head them, for this very often is immediate death to them: but if they survive, they seldom recover in five or six years.

If these trees are intended for a wall, plant dwarfs between the standards; but the latter, as the former fill the walls, must be cut away, to make room for them. But never plant standard Cherries over other fruits; for there is no sort of fruit that will prosper well under the drip of Cherries.

When these trees are taken up from the nursery, shorten the roots, and cut off all the bruised parts, as also the small fibres, which would dry, grow mouldy, and be a great prejudice to the new fibres in their coming forth; cut off likewise the dead part of the stock which was left above the bud, close down to the back part of it, that the stock may be covered by the bud. If these trees are designed for wall, place the bud directly from the wall, that the back part of the stock which was cut may be hid from sight. The soil that Cherries thrive best in is a fresh hazel loam: if it be a dry gravel they will not live many years, and will be perpetually blighted in the spring.

The sorts commonly planted against walls are the Early May and May Duke, which should have a south aspect. The Hearts and common Duke will thrive on a west wall, and in order to continue the Duke later in the season, they are frequently placed against north and north-west walls, where they succeed very well. The Morello, which is chiefly planted for preserving, is commonly put on a north wall. The Hearts are all ill bearers, for which reason they are seldom planted against walls; but probably if they were grafted on the Bird Cherry, and managed properly, that defect might be remedied; for it is said that this stock will render Cherries very fruitful; and having the same effect on Cherries as the Paradise stock has on Apples, they may be kept in less compass: at least it is an experiment well worth the trial.

Cherry trees planted against a wall, should be at least twenty or twenty-four feet asunder, with a standard tree between each dwarf: for these trees will extend themselves as far as, or farther than Apricots, and many other sorts of fruit.

In pruning Cherries, the shoots should never be shortened, for most of them produce their fruit buds at their extreme part, which by shortening are cut off, and this often occasions the death of the shoot: their branches should therefore be trained in at full length horizontally, observing in May, where there is a vacancy in the wall, to stop some strong adjoining branches, which will occasion their putting out two or more shoots; by which means, at that season of the year, there may always be a supply of wood for covering the wall; at the same time displace all fore-right shoots by the hand, for if they are suffered to grow till winter, they will not only deprive the bearing branches of their proper supply of nourishment, but when they are cut out, they occasion the tree to gum in that part; for Cherries bear the knife worse than any other sort of fruit-trees: but be careful not to rub off the sides or spurs which are produced upon the two or three years old wood; for it is upon these that the greatest part of the fruit is produced, and they will continue fruitful for several years. It is

for want of duly observing this caution that Cherry-trees are often so unfruitful, especially the Morello, which shoots the weaker, the more it is cut.

Some persons graft the Duke and other sorts of Cherries upon the Morello, which is but a weak shooter, in order to check the luxuriant growth of their trees, which will succeed for three or four years; but they are not of long duration, nor will they make shoots above six or eight inches long; being closely covered with blossoms, they may produce some fruit in a small compass; but such experiments are unfit for general use, and proper only to satisfy curiosity; and it is much better to allow the trees a greater share of room against the walls, when one tree so planted, and properly managed, will produce more fruit than twenty of these trees, or twice that number, when they are planted too close, though they are grafted upon the Black Cherry, or any other free stock.

The double-flowering Cherry is propagated by budding or grafting on the Black or Wild Cherry stock; and the trees are very proper to intermix with flowering trees of the second growth. The flowers are as large and double as a Cinnamon Rose, and being produced in large bunches on every part of the tree, render it one of the most beautiful trees of the spring. Some of the flowers, which are less double, often produce fruit, which the very double flowers do not.

The Black Cherry is seldom grafted or budded, but is generally sown for stocks: where persons however are curious to have the best flavoured of this sort of fruit, they should be grafted from such trees as produce the best. They are always trained as standards, the Coroun for the orchard, and the small wild black and red for plantations in parks, &c.

Plums. All the varieties are propagated by budding or grafting upon stocks of the Muscle, white Pear, St. Julian, Bonum Magnum, or any of the free-shooting Plums. The manner of raising these stocks is well known. Budding is much preferable to grafting for Plum-trees, because they are very apt to gum, wherever large wounds are made on them.

The trees should not be more than one year's growth from the bud when they are transplanted, for if they are older they are very subject to canker; or if they take well to the ground, commonly produce only two or three luxuriant branches.

Plums should have a middling soil, neither too wet and heavy, nor over light and dry, in either of which extremes they seldom do so well; and those sorts which are planted against walls, should have an east or south-east aspect, which is more kindly to these fruits than a full south aspect, on which they are subject to shrivel, and be very dry; and many sorts will be extremely mealy, if exposed too much to the heat of the sun; but most sorts will ripen extremely well on espaliers, if rightly managed.

There are some persons who plant Plums for standards, in which method some of the ordinary sorts will bear very well; but then the fruit will not be near so fair as those produced on espaliers, and will be more in danger of being bruised or blown down by strong winds. The distance of placing them for espaliers must be the same as against walls, as must also their pruning and management; so that whatever may be hereafter mentioned for one, should be likewise understood for both.

Plums do not only produce their fruit upon the last year's wood, but also upon cursons or spurs, which come out of wood that is many years old; so that there is not a necessity of shortening the branches, in order to obtain new shoots annually, in every part of the tree (as in Peaches, Nectarines, &c. hath been directed) since the more these trees are pruned, the more luxuriant they grow, until the strength of them is exhausted, and then they gum and spoil: therefore the safest method to manage these trees is, to lay in their shoots horizontally, as they are produced, at equal distances, in proportion to the length of their leaves; and where there is not a sufficient quantity of branches to fill up the vacancies of the tree, there the shoots may be pinched the beginning of May (in the

manner as hath been directed for Peaches, &c.) which will cause them to produce some lateral branches to supply those places; and during the growing season, all fore-right shoots should be displaced, and such as are to remain must be regularly trained in to the wall or espalier, which will not only render them beautiful, but also give to each part of the trees an equal advantage of sun and air: and hereby the fruit will be always kept in a ductile growing state, which they seldom are when overshaded with shoots some part of the season, and then suddenly exposed to the air, by taking off, or training those branches in their proper position.

With thus carefully going over these trees in the growing season, there will be but little work to do to them in winter; for when the branches are shortened, the fruit is cut away, and the number of shoots increased: for whenever a branch is shortened, there are commonly two or more shoots produced from the eyes immediately below the cut: so that by thus unskilfully pruning, many persons crowd their trees with branches, and thereby render what little fruit the trees produce, very small and ill-tasted; which is very commonly found in too many gardens, where the manager, perhaps, thinks himself a complete master of his business; for nothing is more common than to see every branch of a fruit-tree pass the discipline of the knife, however disagreeable it be to several sorts of fruits. And it is common to see these trees planted at the distance of fourteen or sixteen feet, so that the walls are in a few years covered with branches; and then all the shoots are cut and mangled with the knife, so as to appear like a stumped hedge, and produce little fruit; therefore the only way to have Plum-trees in good order, is to give them room, and extend their branches at full length.

Genus 33. PUNICA. *Pomegranate Tree.*

Species 1. *Common Pomegranate Tree.* (PUNICA GRANATUM.)

Vide our account of this tree, last Section, p. 413.

CULTURE.

The flowers of this tree always proceed from the extremity of the branches which are produced the same year. This therefore directs, that all weak branches of the former year should be cut out, and that the stronger should be shortened in proportion to their strength, in order to obtain new shoots in every part of the tree. The branches may be laid in against the wall about four or five inches asunder; for, as their leaves are small, there is not a necessity of allowing them a greater distance. The best time for this work is about Michaelmas, or a little later, according to the mildness of the season, for if they are left until spring before they are pruned, they seldom put out their shoots so early, and the earlier they come out, the sooner the flowers will appear, which is of great consequence where fruit is desired. In summer they will require no other dressing, but to cut off all vigorous shoots which grow from the wall, and never produce flowers (for it is the middling shoots only which are fruitful); and when the fruit is formed, the branches on which they grow should be fastened to the wall to support them, otherwise the weight of the fruit, when grown large, will be apt to break them down.

Though, as I said before, the fruit of this tree seldom arrives to any perfection in this country, so as to render it valuable; yet, for the beauty of its scarlet-coloured flowers, together with the variety of its fruit, there should be one tree planted in every good garden, since the culture is not great which they require; the chief care is to plant them upon a rich strong soil, and in a warm

situation. Upon some trees which had these advantages, I have obtained a great quantity of fruit which have arrived to their full magnitude, but I cannot say they were well flavoured; however, they made a very handsome appearance upon the trees.

The double flowering kind is much more esteemed than the other in this country for the sake of its large, fine, double flowers, which are of a most beautiful scarlet colour; and, if the trees are supplied with nourishment, will continue to produce flowers for two months successively, which renders it one of the most valuable flowering trees yet known. This must be pruned and managed in the same manner as hath been already directed for the fruit-bearing kind, but this sort may be rendered more productive of its beautiful flowers by grafting it upon stocks of the single kind, which will check the luxuriancy of the trees, and cause them to produce flowers upon almost every shoot; by which method I have had a low tree, which was planted in the open air, extremely full of flowers, which made a very fine appearance.

Genus 34. Pyrus. *Pear and Apple Tree.* Class XII. Icosandria. Order IV. Pentagynia.

Species 1. *Common Pear Tree.* (Pyrus Communis.)

1. The Pear grows to a lofty tree, with upright branches, with the twigs or branchlets hanging down. Leaves elliptical, obtuse, serrate; the younger ones clothed with a deciduous cotton underneath and along the edge. Stipules linear. Flowers in terminating villose corymbs. Corolla snow-white. Pome produced at the base, hard and acerb (in the wild state), with five cells in the middle, each two-valved, and (regularly) containing two seeds.*

The wild Pear, the mother of all the orchard and garden varieties, is thorny.† The stipules are setaceous, white (or reddish), deciduous: the peduncles alternate: the calyx clothed with a ferruginous wool.‡

The wood of the Pear is light, smooth and compact: it is used by turners and to make joiners tools; and for picture frames, to be stained black. The leaves afford a yellow dye, and may be used to give a green to blued cloths. The juice of the fruit fermented is called Perry. The Squash, Oldfield and Barland Perrys are reckoned the best, and are little inferior to wine.§

The Pear is a native of Europe. It is not known whence the numerous cultivated varieties are derived. This fruit was familiar to the ancients, and has long been a great favourite with the French. It was doubtless not unknown to our remote ancestors, but does not seem to have been in equal favour with them as with their neighbours.

In an account book of Henry VIII. now remaining in the Exchequer, there are the following charges, among others:

For Medlars and Wardens (Pears)	0	3	0
Item to a woman who gaff the Kyng Peres . . .	0	0	2
Item to a woman for three Apples	0	0	12

Chaucer mentions the Pear tree, among other trees growing in this country.

Knoop, in his *Pomologia*, has an hundred and two varieties, engraved and coloured. Duhamel

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* Smith. † Linn. Succ. ‡ Scopoli. § Withering.

enumerates an hundred and nineteen, to which he says thirty or forty indifferent sorts, to be found in common orchards, might be added.

Miller has selected eighty, which are most esteemed for the several purposes to which this fruit is applied. These varieties, says he, which are now cultivated in curious fruit gardens, have been accidentally obtained by seeds; but being generally distinguished by the shape, size and flavour of the fruit, he gives the following distinctions.

1. Pyrus (*Musk*) sativa, fructu æstivo parvo racemoso odoratissimo. Tourn. *Petit Muscat*, Duh. n. 1. t. 1. *i. e. Little Musk Pear, commonly called the Supreme.* This fruit is generally produced in large clusters; it is rather round than long, the stalk short; and, when ripe, the skin is of a yellow colour; the juice is somewhat musky, and, if gathered before it is too ripe, is a good Pear. This ripens the middle of July, and will continue good but for a few days.

2. Pyrus (*Chio*) sativa, fructu æstivo minimo odoratissimo. Tourn. *Poire de Chio; the Chio Pear, commonly called the little Bastard Musk Pear.* This is smaller than the former, but is in shape pretty much like that. The skin, when ripe, has a few streaks of red on the side next the sun, and the fruit seldom hangs in clusters as the former, but in other respects is nearly like it.

3. Pyrus (*Citron des Carmes*, Duh. n. 7. t. 4. Hastiveau is n. 9.) sativa, fructu æstivo, parvo, è viridi albido. Tourn. *Poire Hâtiveau, i. e. the Hasting Pear; Poire Madeline, ou Citron des Carmes, called commonly the green Chisel.* This is a larger Pear than either of the former, and is produced more toward the pedicel. The skin is thin, and of a whitish green colour when ripe; the flesh is melting, and, if not too ripe, of a sugary flavour, but is apt to be mealy. This ripens in the end of July.

4. (*Muscadelle*) sativa, fructu æstivo partim saturatè rubente, partim flavescente. Tourn. *Muscadelle Rouge; the red Muscadelle.* It is also called La Bellissime, i. e. the Fairest or Supreme, Bellissime d'été, or Supreme, Duh. n. 80. t. 42. This is a large early Pear, of great beauty; the skin is of a fine yellow colour, when ripe, beautifully striped with red; the flesh is half melting, and has a rich flavour, if gathered before it be too ripe, but it is apt to be mealy. This generally produces two crops of fruit in a year; the first is commonly ripe about the end of July, and the second ripens in September, but this late crop is seldom well tasted.

5. Pyrus (*Muscat*) sativa, fructu æstivo parvo flavescente moschato. Tourn. Petit Muscat, i. e. *the Little Muscat.* This is a small Pear, rather round than long; the skin is very thin, and, when ripe, of a yellowish colour; the flesh is melting, and of a rich musky flavour, but will not keep long when ripe. This comes the end of July.

6. Pyrus (*Cuisse Madame*) sativa, fructu æstivo oblongo ferrugineo, carne tenerâ moschatâ. Tourn. *Cuisse Madame*, Duh. n. 11. t. 5. *Lady's Thigh, in England commonly called Jargonelle.* This is a very long Pear, of a pyramidal shape, having a long foot-stalk; the skin is pretty thick, of a russet green colour from the sun, but towards the sun it is inclined to an iron colour; the flesh is breaking, and has a rich musky flavour; ripe the beginning of August. This is one of the best early summer Pears yet known, and is certainly what all the French gardeners call the Cuisse Madame, as may be easily observed by their description of this Pear; but I suppose the titles of this and the Jargonelle were changed in coming to England, and they have been continued by the same names.

7. Pyrus (*Windsor*) sativa, fructu oblongo, è viridi flavescente. *The Windsor Pear.* This is an oblong fruit, which swells toward the crown, but near the stalk is drawn toward a point; the skin is smooth, and, when ripe, of a yellowish green colour; the flesh is very soft, and, if permitted to hang but two or three days after it is ripe, grows mealy, and is good for nothing.

8. Pyrus (*Jargonelle*) sativa, fructu æstivo oblongo, è viridi albo. *The Jargonelle*, Duh. n. 6.

now commonly called Cuisse Madame. This is certainly what the French gardeners call the Jargonelle, which, as I have before observed, is now in England given to another fruit much preferable to this, so that two names are changed; for the Jargonelle is always placed amongst those which the French call bad fruit, and the Cuisse Madame is set down amongst their best fruit, which is certainly the reverse with us, as they are now named. This Pear is somewhat like the Windsor, but is not so swelling toward the crown, and is smaller toward the stalk; the skin is smooth, of a pale green colour; the flesh is apt to be mealy if it stands to be ripe, but, being a plentiful bearer, is much propagated for the London markets.

9. Pyrus (*Orange Musk*) sativa, fructu æstivo globoso sessili moschato, maculis nigris consperso. Tourn. *Orange Musquée*, Duh. n. 25. t. 10. *i. e. the Orange Musk.* This is a middle-sized Pear, of a short globular form; the skin is of a yellowish colour, spotted with black; the flesh is musky, but is very apt to be a little dry and choaky. It ripens in August.

10. Pyrus (*Blanquet*) sativa, fructu æstivo albido majori. Tourn. *Gros Blanquet*, Duh. n. 13. *i. e. Great Blanket.* This is also called La Mussette d'Anjou, i. e. the Bagpipe of Anjou. It is a large Pear approaching to a round form: the skin is smooth, and of a pale green colour; the flesh is soft, and full of juice, which has a rich flavour; the stalk is short, thick, and spotted; the wood is slender, and the leaf is very much like that of the tree called the Jargonelle. This ripens the beginning of August.

11. Pyrus (*Musk Blanquet*) sativa, fructu æstivo albido saccharato odoratissimo. Tourn. *The Blanquette, or Musk Blanquette*, Duh. n. 16. t. 6. *the little Blanket Pear.* This Pear is much less than the former, and more pinched in near the stalk, which is also short, but slenderer than that of the former; the skin is soft, and of a pale green colour; the flesh is tender, and full of a rich musky juice; the wood of this tree is much stronger than that of the former, and the shoots are commonly shorter. This ripens the middle of August.

12. Pyrus (*Long-stalk Blanquet*) sativa, fructu æstivo albido, pediculo longo donato. Tourn. *Blanquette à longue queüe*, Duh. n. 15. *Long-stalked Blanket Pear.* This Pear is in shape somewhat like the former, but the eye is larger, and more hollow at the crown; toward the stalk it is somewhat plumper, and a little crooked; the skin is very smooth, white, and sometimes toward the sun is a little coloured; the flesh is between melting and breaking, and is full of a rich sugary juice. This ripens the middle of August.

13. Pyrus (*Skinless*) sativa, fructu æstivo oblongo rufescente saccharato. Tourn. *Poire sens Peau*, Duh. n. 35. t. 13. *the Skinless Pear.* It is also called Fleur de Guigne, i. e. Flower of Guigne; and by some, Rousselet hâtif, i. e. the early Russelet. This is a middle-sized fruit, of a long shape, and a reddish colour, somewhat like the Russelet; the skin is extremely thin; the flesh is melting, and full of a rich sugary juice; the shoots are long and straight. This ripens the middle of August.

14. Pyrus (*Robine*) sativa, fructu æstivo turbinato, carne tenera saccharata. *Muscat Robine, i. e. the Musk Robine Pear.* This is also called Poire à la Reine, i. e. the Queen's Pear; Poire d'Ambre, i. e. the Amber Pear; and Pucelle de Xaintonge, i. e. the Virgin of Xaintonge. Duh. n. 3. t. 2. This is a small round Pear, of a yellowish colour when ripe; the flesh is between melting and breaking. It has a rich musky flavour, and is a great bearer; it ripens the middle of August.

15. Pyrus (*Drone*) sativa, fructu æstivo turbinato moschato. *Le Bourdon Muské*, Duh. n. 27. *the Musk Drone Pear.* This is a middle-sized round fruit, whose skin is of a yellowish colour when ripe; the flesh is melting, and has a high musky juice, but it must not hang too long on the tree, for it is subject to grow mealy in a short time. This ripens the end of August.

16. Pyrus (*Orange*) sativa, fructu æstivo globoso sessili, è viridi purpurascente saccharato odorato. Tourn. *Orange Rouge*, Duh. n. 26. *the red Orange Pear*. This Pear has been the most common of all the sorts in France, which was occasioned by the general esteem it was in some years since. This is a middle-sized round fruit, of a greenish colour, but the side next the sun changed to a purple colour when ripe; the flesh is melting, and the juice is sugared with a little perfume; the eye is very hollow, and the stalk is short. This ripens the end of August.

17. Pyrus (*Cassolete*) sativa, fructu æstivo oblongo minori cinereo odorato. Tourn. *Cassolette. Friolet. Muscat-Vert. Lechefrion.* Duh. n. 44. t. 18. This is so called from its being shaped like a perfuming-pot. It is a long fruit, in shape like the Cuisse Madame, of an Ash colour; its flesh is melting, and full of a perfumed juice, but it is very apt to rot in the middle as soon as ripe, otherwise it would be esteemed an excellent Pear. It is ripe the end of August.

18. Pyrus (*Orange Musk*) sativa, fructu æstivo turbinato è viridi albido. *Orange Muskée*, Duh. n. 25. t. 10. *the Musk Orange Pear*. This is a large round Pear, in shape like a Bergamot; the skin is green, and the flesh is melting, but it is very subject to rot upon the tree, which renders it not near so valuable as some others. It ripens the end of August.

19. Pyrus (*Ognonet*) sativa, fructu æstivo globoso è viridi purpurascente. Tourn. *Gros Ognonet*, Duh. n. 19. t. 8. *the Great Onion Pear*. It is also called Amiréroux, i. e. Brown Admired; and Roy d'Eté, i. e. King of Summer; Archiduc d'Eté, i. e. the Summer Archduke. This is a middle-sized round Pear, of a brownish colour next the sun; the flesh is melting, and the juice is passably good. This ripens the end of August.

20. Pyrus (*Averat*) sativa, fructu æstivo globoso sessili ex albido flavescente saccharato odorato. Tourn. *Robine*, Duh. n. 56. t. 27. It is also called Muscat d'Aoust, i. e. the August Muscat; Poire d'Averat, i. e. the Averat Pear; and Poire Royale, i. e. the Royal Pear. This is a roundish flat Pear, in shape very like a Bergamot; the stalk is long, straight, and a little spotted, and the eye is a little hollowed; the skin is smooth, and of a whitish yellow colour; the flesh is breaking, but not hard, and its juice is richly sugared and perfumed. It is a great bearer, and is esteemed one of the best summer Pears yet known; it ripens the end of August.

21. Pyrus (*Rose*) sativa, fructu æstivo globoso sessili odorato. Tourn. *Poire de rose*, Duh. n. 57. *the Rose-Pear; and Epine-rose, i. e. the Thorny Rose*. This is a short round fruit, shaped like the great Onion Pear, but much larger; of a yellowish green colour; but a little inclining to red on the side next the sun; the stalk is very long and slender; the flesh is breaking, and the juice is musky: this ripens the end of August. The shoots and the leaves of this tree are large.

22. Pyrus (*Pouchet*) sativa, fructu æstivo globoso albido saccharato. Tourn. *Poire du Pouchet*. This is a large, round, whitish Pear, shaped somewhat like the Besideri; the flesh is soft and tender, and the juice is sugary: this ripens the end of August.

23. Pyrus (*Parfumé*) sativa, fructu æstivo turbinato sessile saturatiùs rubente punctato. Tourn. *Poire Parfumé, i. e. the perfumed Pear*. This is a middle-sized round fruit, whose skin is somewhat thick and tough, and of a deep red colour, spotted with brown; the flesh is melting, but dry, and has a perfumed flavour. This ripens the end of August.

24. Pyrus (*Boncrétien*) sativa, fructu æstivo oblongo magno, partim rubro, partim albido odorato. Tourn. *Boncrétien d'Eté*, Duh. n. 40. t. 47. f. 4. *the Summer Boncrétien*. This is a large oblong fruit, whose skin is smooth and thin; the side next the sun is of a beautiful red colour, but the other side is of a whitish green; the flesh is between breaking and tender, and is very full of juice, which is of a rich perfumed flavour. It ripens the beginning of September.

25. Pyrus (*Salviati*) sativa, fructu æstivo globoso, ex rubro albidoque flavescente saccharato odorato. Tourn. *Salviati*, Duh. n. 21. t. 9. This Pear is pretty large, round, and flat, very much

like the Besideri in shape, but not in colour; the stalk is very long and slender, and the fruit is a little hollowed both at the eye and stalk; the colour is red and yellow next the sun, but on the other side is whitish; the skin is rough, the flesh is tender, but a little soft, and has no core; the juice is sugary and perfumed, somewhat like the Robine, but is not near so moist. This ripens the beginning of September.

26. Pyrus (*Caillot-rosat*) sativa, fructu æstivo globoso sessili rufescente odorato. Tourn. *Caillot-rosat*, Duh. p. 177, *the Rose-water Pear*. This is a large round Pear, somewhat like the Messire Jean, but rounder; the stalk is very short, and the fruit is hollowed like an Apple, where the stalk is produced; the skin is rough, and of a brown colour; the flesh is breaking, and the juice is very sweet. This ripens the middle of September.

27. Pyrus (*Choak-Pear*) sativa, fructu æstivo longo, acerbitate strangulationem minitante. Tourn. *Poire d'Etrangillon, the choaky Pear*. The flesh is red. This is seldom preserved in gardens, so there needs no description of it.

28. Pyrus (*Rousselet*) sativa, fructu æstivo oblongo è ferrugineo rubente, nonnunquam maculato. *Poire du Rousselet, the Russelet Pear*. Gros Rousélet. Roy d'eté. Duh. n. 34. t. 12. This is a large oblong Pear; the skin is brown, and of a dark red colour next the sun; the flesh is soft and tender, without much core; the juice is agreeably perfumed, if gathered before it be too ripe. This produces larger fruit on an espalier than on standard trees: it ripens the middle of September.

29. Pyrus (*Prince's Pear*) sativa, fructu æstivo subrotundo, partim rubro, partim flavescente, odorato. *Poire de Prince, the Prince's Pear*. This is a small roundish Pear, of a bright red colour next the sun, but a yellowish colour on the opposite side; the flesh is between breaking and melting; the juice is very high-flavoured: it is a great bearer. This ripens the middle of September, but will keep a fortnight good, which is what few summer-fruits will do.

30. Pyrus (*Moüille-bouche*) sativa, fructu æstivo globoso viridi, in ore liquescente. *Gross Moüille-bouche, i. e. the great Mouthwater Pear*. This is a large round Pear with a smooth green skin; the stalk is short and thick; the flesh is melting, and full of juice, if gathered before it be too ripe, otherwise it is apt to grow mealy. This ripens the middle of September.

31. Pyrus (*Bergamotte d'Eté*) sativa, fructu æstivo rotundo sessili saccharato, è viridi flavescente. *Bergamotte d'Eté*, Duh. n. 45. *Summer Bergamot*. This is by some called the Hamden's Bergamot. It is a pretty large, round, flat Pear, of a greenish yellow colour, and hollowed a little at both ends like an Apple; the flesh is melting, and the juice is highly perfumed. This ripens the middle of September.

32. Pyrus (*Autumn Bergamot*) sativa, fructu autumnali sessili saccharato odorato è viridi flavescente, in ore liquescente. Tourn. *Bergamotte d'Automne*, Duh. n. 48. t. 21. *the Autumn Bergamot*. This is a smaller Pear than the former, but is nearly of the same shape; the skin is of a yellowish green, but changes to a faint red on the side next the sun; the flesh is melting, and its juice is richly perfumed. It is a great bearer, ripens the end of September, and is one of the best Pears of the season.

33. Pyrus (*Swiss Bergamot*) sativa, fructu autumnali turbinato viridi, striis sanguineis distincta. Tourn. *Bergamotte Suisse*, Duh. n. 47. t. 20. *the Swiss Bergamotte*. This Pear is somewhat rounder than either of the former; the skin is tough, and of a greenish colour, striped with red: the flesh is melting, and full of juice, but is not so richly perfumed as either of the former. This ripens the end of September.

34. Pyrus (*Beurré Rouge*) sativa, fructu autumnali suavissimo, in ore liquescente. Tourn. *Beurré Rouge*, Duh. n. 75, 76. t. 38, 39. *the red Butter Pear*. It is called l'Amboise, and in Normandy Isambert; as also Beurré gris, i. e. the grey Beurré; and Beurré vert, i. e. the green Beurré Pear.

All these different names of Beurrés have been occasioned by the difference of the colours of the same sort of Pear, which is either owing to the different exposure where they grew, or from the stock, those upon the free stocks being commonly of a browner colour than those which are upon Quince stocks, whence some persons have supposed them to be different fruits, though in reality they are the same. This is a large long fruit, for the most part of a brown colour. The flesh is very melting, and full of a rich sugary juice. It ripens the beginning of October, and, when gathered from the tree, is one of the very best sort of Pears we have.

35. Pyrus (*Dovenne*) sativa, fructu autumnali turbinato sessili flavescente, et in ore liquescente. Tourn. *Dovenné*, Duh. n. 81. t. 43, *the Dean's Pear*. It is also called by all the following names; Saint Michel, i. e. Saint Michael; Beurré blanc d'Automne, i. e. the white Autumn Butter Pear; Poire de Neige, i. e. the Snow Pear; Bonne Ente, i. e. a good Graft; the Carlisle, and Valentia. This is a large fruit, in shape somewhat like the grey Beurré, but shorter and rounder; the skin is smooth, and, when ripe, changes to a yellowish colour; the flesh is melting, and full of juice, which is very cold, but it will not keep good much more than a week after it is gathered, being very subject to grow mealy; it is a very indifferent fruit. This is a great bearer, and ripens the beginning of October.

36. Pyrus (*Verte-longue*) sativa, fructu autumnali longo viridique odorato, in ore liquescente. Tourn. *La Verte-longue*, Duh. n. 74. t. 73. *the long green Pear*. It is also called Mouille bouche d'Automne, i. e. the Autumn Mouthwater Pear. This is a long fruit, which is very green when ripe; the flesh is melting, and very full of juice, which, if it grows upon a dry warm soil, and a free stock, is very sugary, otherwise it is but a very indifferent Pear. It ripens the middle of October, but in some years will keep till December.

37. Pyrus (*Messire Jean*) sativa, fructu autumnali tuberoso sessili saccharato, carne durâ. Tourn. *Messire Jean blanc & gris*, Duh. n. 55. t. 26. *the white and grey Monsieur John*. These, although made two sorts of fruit by many persons, are indubitably the same; the difference of their colour proceeding from the different soils and situations where they grow, or the stocks on which they are grafted. This pear, when grafted on a free stock, and planted on a middling soil, neither too wet nor over dry, is an excellent autumn Pear; but when it is grafted on a Quince stock, it is very apt to be stony; or if planted on a very dry soil, is very apt to be small and good for little, unless the trees are watered in dry seasons, which has rendered it less esteemed by some persons, who have not considered the cause of their hardness; for when it is rightly managed, there are not many Pears in the same season to be compared with it. This is a large roundish fruit, the skin is rough, and commonly of a brown colour; the flesh is breaking, and full of a rich sugared juice. It ripens the end of October, and will continue good near a month.

38. Pyrus (*Muscat fleuri*) sativa, fructu autumnali globoso ferrugineo, carne tenerâ sapidissimâ. Tourn. *Muscat fleuri*, Duh. n. 4. *the flowered Muscat*. It is also called Muscat à longue queue d'Automne, i. e. the long-stalked Muscat of the Autumn. This is an excellent Pear, of a middling size, and round; the skin is of a dark red colour; the flesh is very tender, and of a delicate flavour. It ripens the end of October.

39. Pyrus (*Poire de Vigne*) sativa, fructu autumnali globoso ferrugineo, carne viscidâ. Tourn. *Poir de Vigne*, Vigne. Demoiselle. Duh. n. 110. t. 58. f. 2. *the Vine Pear*. This is a round fruit, of a middling size; the skin of a dark red colour; the flesh is very melting, and full of a clammy juice; the stalk is very long and slender. The fruit should be gathered before it be full ripe, otherwise it grows mealy and soon rots. It ripens the end of October.

40. Pyrus (*Rousseline*) sativa, fructu autumnali oblongo, dilutè rufescente, saccharato, odoratissimo. Tourn. *Poire Rousseline*, Duh. n. 87. t. 15. *the Rousseline Pear*. It is also called in Touraine,

Le Muscat à longue queüe de la fin d'automne, i. e. the long-stalked Muscat of the end of autumn. This is by some English gardeners called the Brute-bonne, but that is a very different fruit from this. It is shaped somewhat like the Rousselet, but the skin of this is smooth, and of a greenish yellow from the sun, but the side next the sun is of a deep red colour, with some spots of grey; the flesh is very tender and delicate; the juice is very sweet, with an agreeable perfume. It ripens the middle of October, but must not be long kept, lest it rot in the middle.

41. Pyrus (*Pendar*) sativa, fructu autumnali oblongo majori cinereo. Tourn. *Poire Pendar, i. e. the Knave's Pear.* This is very like the Cassolette Pear, but is somewhat larger; the flesh is fine and tender; the juice is very much sugared. It ripens the end of October.

42. Pyrus (*Suaré vert*) sativa, fructu autumnali turbinato tuberoso viridi saccharato, in ore liquescente. Tourne. *Sucré vert*, Duh. n. 68. t. 34. *the green Sugar Pear.* This Pear is shaped like the Winter Thorn, but is smaller; the skin is very smooth and green; the flesh is very buttery; the juice is sugared, and of an agreeable flavour; but it is sometimes subject to be stony in the middle, especially grafted on a Quince stock.

43. Pyrus (*Marquise*) sativa, fructu autumnali tuberoso sessili, è viridi flavescente, maculis nigris consperso, carne tenerâ saccharatâ. Tourn. *La Marquise*, Duh. n. 93. t. 49. *the Marchioness's Pear.* This is often of two different shapes, according to the nature of the soil where they are planted; for when the soil is dry, the fruit very much resembles a fine Blanquet; but when the soil is very rich and moist, it grows much larger. It is a well-shaped Pear, flat at the top; the eye is small and hollowed; the skin is of a greenish yellow, a little inclining to red on the side next the sun. If this Pear does not change yellow in ripening it is seldom good; but if it does, the flesh will be tender and delicate, very full of juice, which is sugared. It ripens the beginning of November.

44. Pyrus (*Chat-brulé*) sativa, fructu autumnali, oblongo, partim albido, partim rufescente. *The Chat-brulé*, Duh. n. 116. *the Burnt Cat.* It is also called Pucelle de Xaintogne, i. e. the Virgin of Xaintogne. This is a small oblong Pear, shaped much like the Martin Sec, but differs from it in colour, this being of a pale colour on one side, but of a dark brown on the other; the skin is smooth; the flesh is tender, but dry, and, if kept a short time, is apt to grow mealy. It is in eating the beginning of November.

45. Pyrus (*Besideri*) sativa, fructu autumnali globoso sessili, ex albido flavescente. *Le Bezi d'Hery*, Duh. n. 23. It is so called from Heri, which is a forest in Bretagne, between Rennes and Nantes, where this Pear was found. This is a middle-sized round Pear, of a pale green, inclining to a yellowish colour; the stalk is very long and slender; the flesh is dry, and but very indifferent for eating, but it bakes well. It ripens the middle of November.

46. Pyrus (*Crasane*) sativa, fructu brumali sessili, è viridi flavescente, maculato, utrinque umbilicato, in ore liquescente. Tourn. *The Crasanne, or Bergamotte Crasanne*, Duh. n. 41. t. 22. It is also called Bucrré Plat, i. e. the flat Butter Pear. This is a middle-sized Pear, hollowed at the crown like an Apple; the stalk is very long and crooked; the skin is rough, of a greenish yellow colour when ripe, covered over with a russet coat; the flesh is extremely tender and buttery, and is full of a rich sugary juice, and is the very best Pear of the season. This is in eating the middle of November.

47. Pyrus (*Dauphine*) sativa, fructu brumali turbinato sessili flavescente saccharato odorato, in ore liquescente. Tourn. *Lansac ou la Dauphine*, Duh. n. 109. t. 57. *the Lansac or Dauphine Pear.* This Pear is commonly about the size of a Bergamot, of a roundish figure, flat towards the head, but a little produced towards the stalk; the skin is smooth, and of a yellowish green colour; the flesh is yellow, tender, and melting; the juice is sugared, and a little perfumed; the eye is very large, as is

also the flower, and the stalk is long and straight. When this Pear is upon a free stock, and planted on a good soil, it is one of the best fruits of the season; but when it is on a Quince stock, or upon a very dry soil, the fruit will be small, stony, and worth little. It ripens the end of November.

48. Pyrus (*Martin Sec*) sativa, fructu brumali oblongo, partim intensè, partim dilute ferrugineo, saccharato, odorato. Tourn. *Martin Sec*, Duh. n. 36. t. 14. *the Dry Martin*. This is sometimes called the Dry Martin of Champagne, to distinguish it from another Dry Martin of Burgundy. This Pear is almost like the Rousselet in shape and colour, which has occasioned some persons to give it the name of Winter Russelet. It is an oblong Pear, whose skin is of a deep russet colour on one side, but the other side is inclining to a red; the flesh is breaking and fine; the juice is sugared, with a little perfume, and if grafted on a free stock, is an excellent Pear, but if it be on a Quince stock, it is very apt to be stony. It is in eating the end of November, but if permitted to hang the full time on the tree, will keep good two months.

49. Pyrus (*Bigarrade*) sativa, fructu brumali magno sessili, è cinereo flavescente. Tourn. *La Villaine d'Anjou*. It is also called Poire Tulipée, i. e. the Tulip Pear, and Bigarrade, i. e. the Great Orange. This is a large round Pear, with a very long slender stalk; the skin is of a pale yellow colour; the flesh is breaking, but not very full of juice. This is in eating the end of November.

50. Pyrus (*Poire de gros queüe*) sativa, fructu brumali flavescente odoratissimo, pediculo crassiori. Tourn. *Poire de gros queüe, i. the large stalked Pear*. This is a large roundish Pear, with a yellow skin; the stalk is very thick, from whence it had the name; the flesh is breaking and dry, and has a very musky flavour; but it is apt to be stony, especially if it be planted in a dry soil, or grafted on a Quince stock, as are most of the perfumed Pears.

51. Pyrus (*Amadote*) sativa, fructu brumali turbinato rufescente odorato. *L'Amadote, i. e. the Amadot Pear*. This is a middle-sized Pear, somewhat long, but flat at the top; the skin is generally rough, and of a russet colour; the flesh is dry and high-flavoured, if grafted on a free stock. The wood of this tree is generally thorny, and is esteemed the best sort of Pear for stocks to graft the melting Pears upon, because it gives them some of their fine musky flavour. It is in eating the beginning of December, but will keep good six weeks.

52. Pyrus (*Bouvar*) sativa, fructu brumali, globoso, dilutè virente, tuberoso, punctato, in ore liquescente. Tourn. *Petit Oin, i. e. Little Lard Pear*. It is also called Bouvar and Rousette d'Anjou, i. e. the Russet of Anjou; and Amadont, and Merveille d'Hyver, i. e. the Wonder of the Winter. This Pear is of the size and shape of the Ambret or Lesclasserie, but the skin is of a clear green colour, and a little spotted; the stalk is pretty long and slender; the eye is large, and deeply hollowed; the flesh is extremely fine, and melting; the juice is much sugared, and has an agreeable musky flavour. It is in eating the middle of December, and is esteemed one of the best fruits in that season. This is better on a free stock than upon the Quince.

53. Pyrus (*Louisebonne*) sativa, fructu brumali, longo, è viridi albicante, in ore liquescente. Tourn. *Louisebonne*, Duh. 97. t. 33. This Pear is shaped somewhat like the St. Germain, or the Autumn Vertelougue, but is not quite so much pointed; the stalk is very short, fleshy, and somewhat bent; the eye and the flower are small; the skin is very smooth; the colour is green, inclining to a pale colour when ripe; the flesh is extremely tender and full of juice, which is very sweet, especially when it grows upon a dry soil, otherwise it is apt to be very large and ill tasted. It is in eating the beginning of December.

54. Pyrus (*Colmar*) sativa, fructu brumali, tuberoso, è viridi flavescente, punctato, saccharato. Tourn. *Poire de Colmar, i. e. the Colmar Pear*. It is also called Poire Manne, the Manna Pear, and Bergamotte tardive, the late Bergamot. Colmart Poire Manne. Duh. n. 94. t. 50. This Pear is somewhat like a Boncrêtien in shape, but the head is flat; the eye is large, and deeply hollowed; the

middle is larger than the head, and is sloped toward the stalk, which is short, large, and a little bent; the skin is green, with a few yellowish spots, but is sometimes a little coloured on the side next the sun; the flesh is very tender, and the juice is greatly sugared. It is in eating the latter end of December, but will often keep good till the end of January, and is esteemed one of the best fruits of that season.

55. Pyrus (*L'Eschasserie*) sativa, fructu brumali, globoso, citriformi, flavescente, punctato, in ore liquescente, saccharato, odoratissimo. Tourn. *L'Eschasserie.* It is also called Vertelongue d'Hyver, i. e. the Winter long green Pear, and Besidéri Landri, i. e. the Landry Wilding. Echassery. Bezi de Chassery, Duh. n. 66. t. 32. This Pear is shaped like a Citron; the skin is smooth, and of a green colour, with some spots while it hangs on the tree, but as it ripens it becomes of a yellowish colour; the stalk is straight and long; the eye is small, and not hollowed; the flesh is melting, and buttery; the juice is sugared, with a little perfume. It is in eating the latter end of December.

56. Pyrus (*Virgouleuse*) sativa, fructu brumali longo, è viridi flavescente, in ore liquescente, saccharato. Tourn. *Le Virgoulé, or La Virgouleuse,* Duh. n. 95. t. 51. It is also called Bujaleuf, and Chambrette; and Poire de Glace, i. e. the Ice Pear in Gascoigne; but it is called Virgoule, from a village of that name in the neighbourhood of St. Leonard in Limousin, where it was raised and sent to Paris by the Marquis of Chambret. This Pear is large, long, and of a green colour, inclining to yellow as it ripens; the stalk is short, fleshy, and a little bent; the eye is of a middling size, and a little hollowed; the skin is very smooth, and sometimes a little coloured towards the sun; the flesh is melting, and full of a rich juice. It is in eating the latter end of December, and will continue good till the end of January, and is esteemed one of the best fruits of the season; but the tree is very apt to produce vigorous shoots, and the blossoms being generally produced at the extreme part of the shoot, when they are shortened, the fruit will be entirely cut away, which is the reason it is condemned as a bad bearer; but when it is grafted on a free stock, it ought to be allowed upwards of thirty feet, and the branches trained in against the espalier or wall, at full length, in a horizontal position, as they are produced. Where this tree is thus treated, it will bear very plentifully, and the fruit will be good.

57. Pyrus (*Ambrette*) sativa spinosa, fructu globoso, sessili, ferrugineo, in ore liquescente, saccharato, odoratissimo. Tourn. *Ambrette,* Duh. n. 65. t. 31. This is so called from its musky flavour, which resembles the smell of the Sweet Sultan Flower, which is called Ambrette in France. This Pear is like the Leschasserie in shape, but is of a russet colour; the eye is larger, and more hollowed; the flesh is melting, and the juice is richly sugared and perfumed; the seeds are large and black, and the cells in which they are lodged are very large: the wood is very thorny, especially when grafted on free stocks. The fruit is in eating the latter end of December, and continues good till the latter end of January, and is esteemed a very good fruit by most people.

58. Pyrus (*Epine d'Hiver*) sativa, fructu brumali, magno, pyramidato, albido, in ore liquescente, saccharato, odorato. Tourn. *Epine d'Hiver,* Duh. n. 64. t. 44. f. 3. *Winter-thorn Pear.* This is a large fine Pear, nearly of a pyramidal figure; the skin is smooth, and of a pale green colour, inclining to yellow as it ripens; the stalk is short and slender; the flesh is melting and buttery; the juice is very sweet, and in a dry season, is highly perfumed; but when it is planted on a moist soil, or the season proves wet, it is very insipid, so that it should never be planted on a strong soil. It ripens the end of December, and will continue good two months.

59. Pyrus (*Saint Germain*) sativa, fructu brumali longo, è viridi flavescente, in ore liquescente. Tourn. *Saint Germain,* Duh. n. 96. t. 52. *the St. Germain Pear.* It is also called Inconnûe la Fare, i. e. the Unknown of La Fare; it being first discovered upon the banks of a river which is called by that name, in the parish of St. Germain. This is a large long Pear, of a yellowish green colour

when ripe; the flesh is melting, and very full of juice, which in a dry soil is very sweet; but when it is planted on a moist soil, the juice is very apt to be harsh and austere, which renders it less esteemed by some persons, though in general it is greatly valued. This is in eating from the end of December till February.

60. Pyrus (*Saint Austin*) sativa, fructu brumali tuberoso subacido flavescente punctato. Tourn. Saint Augustin, Duh. n. 99. t. 58. f. 3. This is about the size of a middling Virgoulé Pear, but is somewhat shorter and slenderer near the stalk; the skin is of a fine Citron colour, spotted with red on the side next the sun; the flesh is tender, but not buttery, and is pretty full of juice, which is often a little sharp, and to some persons is disagreeable, but others value it on that account. This is in eating in December, and will continue good two months.

61. Pyrus (*Boncrétien d'Espagne*) sativa, fructu brumali pyramidato, partim purpureo, punctis nigris consperso, flavescente. Tourn. *Boncrétien d'Espagne*, Duh. n. 89. t. 46. *the Spanish Boncrétien*. This is a large Pear, of a pyramidal form, of a fine red or purple colour on the side next the sun, and full of small black spots; the other side is of a pale yellow colour, the flesh is breaking, and when it is on a light rich soil, and grafted on a free stock, its juice is very sweet. It ripens in the end of December, and will continue good a month or six weeks. If this be grafted on a Quince stock, it is very apt to be dry and stony. This is a very good fruit for baking.

62. Pyrus (*Poire de Livre*) sativa, fructu brumali, magno, oblongo, turbinato, ferrugineo, utrinque umbilicato. Tourn. *Poire de Livre*, Duh. n. 104. *the Pound Pear*. It is also called Gros Ratteau Gris, the grey rake Pear; and Poir d'Amour. In England this is called Parkinson's Warden, or the black Pear of Worcester. This is a very large Pear, and commonly weighs a pound or more; the skin is rough, and of an obscure red colour on the side next the sun, but somewhat paler on the other side; the stalk is very short, and the eye is greatly hollowed. This is not fit for eating, but bakes or stews exceeding well, and is in season from December to March.

63. Pyrus (*Besi de Cassoy*) sativa, fructu brumali parvo flavescente, maculis rubris consperso. Tourn. *Besi de Cassoy, i. e. the Wilding of Cassoy*, a forest in Bretagne, where it was discovered, and passes under the name of Rousset d'Anjou. It is also called Petit Beurré d'Hyver, i. e. Small Winter Butter Pear. Bezy de Caissoy; or, Roussette d'Anjou, Duh. n. 59. t. 29. This is a small oblong Pear, of a yellowish colour, spotted with red; the flesh is melting, and the juice is very rich. It is in eating in December and January. This is a prodigious bearer, and commonly produces its fruit in large clusters, provided it be not too much pruned; for it generally produces its blossom-buds at the extremity of its shoots, which if shortened, the fruit would be cut away. There was a tree of this kind in the gardens of Camden-house near Kensington, which generally produced a great quantity of fruit.

64. Pyrus (*Martin-sire*) sativa, fructu brumali turbinato inæquali, ventre tumido, partim purpureo, partim flavescente. Tourn. *Ronville*. It is also called Hocrenaille and Martinsire, i. e. the Lord Martin Pear. Martin-sire Ronville, Duh. n. 30. t. 19. f. 5. This Pear is about the size and shape of a large Rousselet; the eye is of a middling size, and hollowed a little; the middle of the Pear is generally swelled more on one side than on the other, but is equally extended towards the stalk; the skin is very smooth and soft, and is of a lively red colour next the sun, but on the other side it changes yellow as it ripens. The flesh is breaking and full of juice, which is very sweet and a little perfumed; but if grafted on a Quince stock, is very apt to be small and stony.

65. Pyrus (*Citron d'Hyver*) sativa, fructu brumali citriformi flavescente duro moschato odoratissimo. Tourn. *Citron d'Hyver, i. e. the Winter Citron Pear*. It is also called the Musk Orange Pear, in some places. This is a pretty large Pear, in shape and colour very like an Orange or Citron, from whence it had its name. The flesh is hard and dry, and very subject to be stony, for which

reasons it is not valued as an eating Pear, but will bake very well. It is in season from December to March.

66. Pyrus (*Rousselet d'Hiver*) sativa, fructu brumali oblongo, & viridi flavescente, saccharato, saporis austeri. Tourn. *Rousselet d'Hiver*, Duh. n. 31. t. 19. f. 2. *the Winter Russelet.* This is by some supposed to be the same Pear as is called the Dry Martin, but it is very different from that in several particulars. The colour of this is a greenish yellow, inclining to brown; the stalk is long and slender, and the flesh is buttery and melting, and generally full of juice, which is very sweet, but the skin is apt to contain an austere juice, so that if it be not pared, it is apt to be disagreeable to many persons' palates. It is in eating in January and February.

67. Pyrus (*Portail*) sativa Pictaviensis, fructu brumali globoso sessili saccharato odorato. Tourn. *Poir Portail.* This Pear was discovered in the province of Poictou, where it was so much esteemed, that they preferred it to most other fruit, though in the opinion of the most curious judges, it does not deserve the great character which is given to it; for it rarely happens that it proves good for eating, being generally dry, stony, and hard, unless in extraordinary seasons, and upon a very good soil. This must always be grafted on a free stock, and should be planted on a light rich soil; and in very dry seasons the trees should be watered, otherwise the fruit will be stony. It is in season from January to March, and bakes well.

68. Pyrus (*France-real*) sativa, fructu brumali magno globoso flavescente, punctis rufis consperso. Tourn. *France-real*, Duh. n. 6. It is also called Fin-or d'Hyver, i. e. the Golden End of Winter. This is a very large Pear, almost of a globular figure; the skin is yellow, spotted with red; and the stalk is short. The flesh of this Pear is dry, and very apt to be stony, but it bakes exceeding well, and continues good from January till March.

69. Pyrus (*Easter Bergamot*) sativa fructu, brumali turbinato sessili subacido flavescente, punctis asperioribus consperso. Tourn. *Bergamotte Bugi.* It is also called Bergamotte de Pâque, the Easter Bergamot, Duh. n. 52. t. 24. It is a large Pear, almost round, but is a little produced in length towards the stalk; the eye is flat and the skin is green, having many rough protuberances like spots dispersed all over, but, as it ripens, becomes yellowish; the flesh is breaking, and in a good season the juice is sweet; but it must have a free stock, a south-east wall, and a good soil, otherwise it is apt to be stony and austere. It is in eating from February till April.

70. Pyrus (*Muscat of Germany*) Muscat d'Alleman, Duh. n. 72. 36. This is an excellent Pear, more long than round, of the shape of the Winter-royal, but is less toward the eye, and is more russet, and of a red colour next the sun; it is buttery, melting, and a little musky. This is in eating in March, April, and sometimes in May, if it is well preserved.

71. Pyrus *Bergamotte de Hollande, or d'Alençon.* Amoselle. Duh. n. 53. t. 25. It is large and round, of the shape of the ordinary Bergamot. The colour is greenish, the flesh is half buttery and tender, the juice is highly flavoured. This is a very good Pear, and will keep till April.

72. Pyrus (*Naples*) Duh. n. 107. t. 56. This is a pretty large, long, greenish Pear; the flesh is half breaking; the juice is sweet, and a little vinous. It is in eating in March. I am in doubt whether this Pear is not in some places taken for a Saint Germain, for there is a Pear in some gardens, very like the Saint Germain, which will keep till April, and this Pear agrees with the characters of that. It is called in England the Easter St. Germain.

73. Pyrus (*Boncrétien d'Hiver*) sativa, fructu brumali magno pyramidato, & flavo nonnihil rubente. Tourn. *Boncrétien d'Hyver*, Duh. n. 87. t. 45. *the Winter Boncrétien Pear.* This Pear is very large and long, of a pyramidal figure; the skin is of a yellowish colour, but the side next the sun inclines to a soft red; the flesh is tender and breaking, and is very full of rich sugared juice. This is esteemed in France one of the best winter Pears, but in England it is seldom so good;

though I am fully satisfied, if it were grafted on a free stock, and planted in a good soil, against a wall exposed to the south-east, and the branches trained at full length, it might be rendered more acceptable than it is at present in England.

74. Pyrus (*Catillac*) sativa, fructu brumali magno, cydoniæ facie, partim flavo, partim purpureo. Tourn. *Catillac*, Duh. n. 102. t. 58. f. 4. This is a large Pear, shaped somewhat like a Quince; the skin is for the most part of a yellow colour, but changes to a deep red on the side next the sun; the flesh is hard, and the juice austere, but it is a very good fruit for baking, and being a plentiful bearer, deserves a place in every good collection of fruit. It will be good from Christmas to April, or longer.

75. Pyrus (*Pastorale*) sativa, fructu brumali oblongo flavescente, punctis rubris consperso. *La Pastorale, Musette d'automne.* Duh. n. 100. t. 55. This Pear is of the size and shape of a fine Rousselet; the stalk is short and crooked; the skin is somewhat rough, of a yellowish colour, spotted with red; the flesh is tender and buttery, and when it grows on a dry soil, the juice is very sweet; but on wet soil, or in moist years, it is subject to have an austere taste. This Pear is in eating in February and March.

76. Pyrus (*Double Fleur*) sativa, fructu brumali sessili, partim purpurascente. Tourn. *La Double Fleur*, Duh. n. 58. t. 28. *the double-flowering Pear.* This is so called, because the flowers have a double range of petals or leaves. It is a large short Pear; the stalk is long and straight; the skin is very smooth, and of a yellowish colour, but the side next the sun is commonly of a fine red or purple colour. This is by some esteemed for eating, but it is generally too austere in this country for that purpose. It is the best Pear in the world for baking or composts. It is good from February to May.

77. Pyrus (*Saint Martial*) sativa, fructu brumali oblongo, partim flavescente, partim purpurascente. *Saint Martial.* It is also called in some places Poire Angelique, i. e. the Angelic Pear; and in the south of France, Poire douce. Angelique de Rome. Duh. n. 108. This Pear is oblong, in shape like the Boncrétien, but not so large, and a little flatter at the crown; it has a very long stalk; the skin is smooth and yellowish, but on the side next the sun it turns to a purplish colour; the flesh is tender and buttery, and the juice is very sweet. This is in eating in February and March.

78. Pyrus (*Besi Chaumontelle*) sativa, fructu brumali oblongo, partim albido, partim purpureo odorato, saccharato. *La Poire de Chaumontelle, or Bezi de Chaumontelle, or Beurre d'hiver.* Duh. n. 78. t. 40. This Pear is in shape somewhat like the Autumn Beurré, but is flatter at the crown; the skin is a little rough, of a pale green colour, but turns to a purplish colour next the sun; the flesh is melting; the juice is very rich, and a little perfumed. It is in eating from November to January, and is esteemed by some as the best late Pear yet known.

79. Pyrus (*Carmelite*) sativa, fructu brumali globoso sessili cinereo maculis amplis obscurioribus consperso. Tourn. *Carmelite.* This is a middle-sized Pear, of a roundish form; the skin is of a grey colour on one side, but is inclining to a red on the other, having some broad spots of a dark colour all over; the flesh is commonly hard and dry, so that it is not very much esteemed. It is in season in March.

80. Pyrus (*Union*) sativa, fructu brumali maximo pyramidato, dilutè virente. *The Union Pear, otherwise called Dr. Uvedale's St. Germain.* This is a very large long Pear, of a deep green colour, but the side next the sun sometimes changes to a red as it ripens. This is not fit for eating, but bakes very well; and being a great bearer, and a very large fruit, deserves a place in every good collection. It is in season from Christmas to April.

There are many other sorts of Pears, which are still continued in some old gardens; but as those

here mentioned are the best sorts known at present, it would be needless to enumerate a great quantity of ordinary fruit; since every one who intends to plant fruit-trees, would rather choose those which are the most valued, the expence and trouble being the same for a bad sort of fruit as a good one. Indeed I have inserted many more than are really worth planting, in order to please such who are fond of great variety; but whoever has a mind to make choice of such only as are good, may easily distinguish them, by attending to the account given of each sort, and hereby every person is at liberty to please himself: for it is not every one who prefers a Beurré Pear, though that is generally esteemed the very best in its proper season: there are some who admire the Messire Jean, for the firmness of its flesh, which to others is a great objection against it; and as some esteem the breaking, and others the melting Pears, I have distinguished them by their descriptions in such a manner, that every one may make choice of the kinds of fruit which are agreeable to their palate: and the different seasons in which each kind is in eating, being exhibited (allowing a little for the difference of seasons, which are earlier some years than others) it is not very difficult for a person to make a collection of good Pears to succeed each other throughout the season of these fruits, both for eating and baking.

The time of each fruit ripening, as here set down, is taken at a medium for seven years, and in the neighbourhood of London, where all sorts of fruit generally ripen a fortnight or three weeks earlier than almost any part of England; and it is very obvious to every person who will attend to the culture of fruit-trees, that their time of ripening is accelerated by long cultivation; for many of the sorts of Pears, which some years past rarely became ripe in England, unless they grew against the best aspected walls, are now found to ripen extremely well on espaliers and dwarfs; and those Pears which seldom were in eating till January, are ripe two months earlier. There is also a very great difference in their time of ripening in different seasons, for I have known the fruit of a Pear-tree in one year all ripe and gone by the middle of October, and the very next year the fruit of the same tree has not been fit to eat till the end of December, so that allowance should be made for these accidents. The Besi de Chaumontelle Pear, about forty years past, was seldom fit to eat before February, and has continued good till the middle of April, but now this Pear is commonly ripe in November; and when it is planted on a warm soil, and against a good aspected wall, it is in eating the middle or end of October. This forwarding of the several kinds of Pears, may be in some measure owing to the stocks upon which they are grafted; for if they are grafted upon early summer Pear stocks, they will ripen much earlier than when they are upon hard winter Pear stocks; and if some of the very soft melting Pears were grafted upon such stocks as are raised from the most austere fruit, such as are never fit to eat, and of which the best Perry is made, it would improve those fruits, and continue them much longer good; or if the common free stocks were first grafted with any of these hard winter Pears, and when they have grown a year, then to graft or bud these soft melting Pears upon them, it would have the same effect; but the Pears so raised will require a year's more growth in the nursery, and consequently cannot be sold at the same price as those which are raised in the common method, these requiring to be twice budded or grafted, so that there is double labour, beside standing a full year longer; but this difference in the first expence of the trees, is not worth regarding by any person who is desirous to have good fruit; for the setting out in a right way is that which every one should be the most careful of, since by mistaking at first, much time is lost, and an after expence of new trees often attends it.

Another cause of fruits ripening earlier now than they formerly did, may be from the length of time they have been cultivated; for it is very certain, that most sorts of plants have been greatly forwarded and improved by culture, within the space of thirty or forty years, as may be known from the several sorts of esculent plants, which are cultivated in the kitchen gardens, and of which

sorts there are many which are annually improving: and if we look back to the best French authors who have written on the subject of fruit-trees, we shall find, that the times of ripening of many sorts of Pears are put down a month or six weeks later about fifty or sixty years ago, than they are now found to ripen about Paris; and here about London it is much the same, for I cannot find they are the least forwarder in the times of their ripening at Paris than at London.

Species 2. *Woolly-leaved Pear Tree.* (Pyrus Pollueria.)

Leaves ovate, pubescent even on the upper surface, especially along the midrib. Peduncles tomentose. Corymb elongated, tomentose. Flowers very numerous, much smaller than in the common Pear.*

Native of Germany. Introduced in 1786, by Mr. John Græfer.†

Species 3. *Alpine Pear Tree.* (Pyrus Nivalis.)

Branchlets or twigs thickish. Leaves elliptic or oval, petioled, silky and whitish underneath. Flowers in terminating corymbs. Fruit globular, extremely acerb, but when ripe melting and very sweet. Native of the mountains of Austria.‡

Species 4. *Common Apple Tree.* (Pyrus Malus.)

The Apple is a spreading tree, with the branches and twigs irregular and twisting, more horizontal than in the Pear. Leaves ovate, serrate, the younger ones pubescent underneath. Stipules linear. Flowers in terminating, sessile, villose umbels. Corollas white, but finely tinged with red on the outside. Fruit roundish, umbilicate at the base, acid.§

The Apple in its wild state, then called the Crab or Wilding, is armed with thorns, as well as the wild Pear. The peduncles are rarely subdivided, and are mostly covered with soft down; as is the inside, and sometimes the outside of the calyx.‖ According to Scopoli, the calyx is smooth on the outside, but lanuginose within, and wrinkled at the base. Probably these circumstances vary. Linnæus distinguishes two varieties of the wild Apple: the common one, with a very acid fruit, and another with a bitter fruit, which becomes sweetish when ripe. This is more rare, and is found chiefly in Smoland. Perhaps it may be the same with the *acerba* of Jacquin.

Mr. Miller mentions two varieties in the fruit of the Crab, one white, the other purple towards the sun: it is commonly of yellowish green with a tinge of red. He also speaks of a variety with variegated leaves; but when the trees grow vigorous, the leaves soon become plain.

Heller thus discriminates the Apple tree. It has many things in common with the Pear tree, but the leaf is more shortly mucronate, less manifestly serrate, subhirsute underneath. The flowers tinged with red, and smelling very sweet. The peduncle shorter. The stamens usually from nineteen to twenty-five. The fruit round, hollowed at the peduncle, depressed at top, less astringent, but more acid than the Pear, of a softer texture. The Apple has woody threads passing through it from the peduncle, ten of which are regularly disposed round the capsules, and tend to the calyx. It is said that the fruit rots when these are broken. The Pear also has them, but they are not so distinct, on

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* Linn. Mant. † Hort. Kew. ‡ Jacquin. § Smith. ‖ Engl. Bot.

account of the calculary or stony congeries. In the Apple they are placed very regularly, one at the point of each cell of the capsule, and one in the middle between the other five. They are very apparent on a transverse section of the fruit. The cells are differently shaped in the two fruits: in the Apple they are narrow and pointed at both ends; in the Pear they are obovate, broad exteriorly, and drawing to a point at the end next the centre of the fruit. The Pear, however it may vary in shape, size, colour, taste, &c. by cultivation, is generally convex and lengthened out at the base: whereas in the Apple it is always concave there. Besides this, the leaves of the Apple are commonly wider in proportion to their length, of a yellower green above, and whitish underneath; whereas in the Pear, they are dark green above, and quite smooth on both sides: their vascular system is very different, being loose in the Apple, and very close in the Pear; hence the leaves of the latter are much stouter, and more permanent. Lastly the growth of these trees is quite different; the Pear being lofty and upright, the Apple low and spreading.

Mr. Miller gives the following account of the varieties of Apples.

I shall first mention a few of those sorts of Apples which have been introduced from France, (Duham. 1. 327. t. 1—14.) which were most of them grafted on Paradise stocks, and were for some time much esteemed, and shall mention those of our own growth afterwards.

1. *Pomme de Rambour*, (Duham. t. 10.) The Rambour is a very large fruit, of a fine red next the sun, and striped with a pale or yellowish green. This ripens very early, commonly about the end of August, and soon grows mealy, therefore is not esteemed in England.

2. *Pomme de Courpendu*, (Duham. t. 6.) the hanging body. This is a very large Apple, of an oblong figure, having some irregular risings or angles, which run from the base to the crown; it is of a red cast on the side towards the sun, but pale on the other side; the foot-stalk is long and slender, so that the fruit is always hanging downward, which occasioned the French gardeners to give it this name.

3. The *Rennette-blanche*, or *White Rennette*, or *French Rennette*, (Duham. n. 17.) This is a large fine fruit, of a roundish figure, and of a pale green, changing a little yellowish when ripe, having some small grey spots; the juice is sugary, and it is good for eating or baking; it will keep till after Christmas sound.

4. The *Renette-grise*, (Duham. t. 9.) This is a middle-sized fruit, shaped like the Golden Rennette, but is of a deep grey colour on the side next the sun, but on the other side intermixed with yellow; it is a very juicy good Apple, of a quick flavour. It ripens in October, and will not keep long.

5. *Pomme d'Api*, (Duham. t. 11.) This is a small hard fruit, of a bright purple colour on the side next the sun, and of a yellowish green on the other side; it is a very firm fruit, but has not much flavour, so it is only preserved by some persons by way of curiosity. It keeps a long time sound, and makes a variety in a dish of fruit.

6. *Le Calville d'Automne*, the Autumn Calville. This is a large fruit of an oblong figure, of a fine red colour towards the sun. The juice is vinous, and much esteemed by the French.

7. *Fenouillat ou Pomme d'Anis*, (Duham. t. 5.) the Fennel, or Anise Apple. This is a middle-sized fruit, a little longer than a Golden Pippin, of a greyish colour. The pulp is tender, and has a spicy taste like Anise-seed; the wood and leaves are whitish.

8. *Pomme Violette*, (Duham. n. 7.) the Violet Apple. This is a pretty large fruit, of a pale green, striped with deep red to the sun. The juice is sugary, and has a flavour of Violets, which occasioned the name.

There are not above two or three of these which are much esteemed in England, viz. the French Rennette, the Rennette-grise, and the Violet Apple; the others being early fruit, which do not keep

long, and their flesh generally mealy, do not deserve to be propagated, as we have many better fruits in England.

I shall now put down those sorts of Apples which are best esteemed in England, placing them in the order according to their time of ripening.

9. The first Apple which is brought to the markets, is the *Codlin*. This fruit is so well known in England, that it is needless to describe it.

10. The next is the *Margaret Apple*: this fruit is not so long as the Codlin, of a middling size; the side next the sun changes to a faint red, when ripe; the other side is of a pale green: the fruit is firm, of a quick pleasant taste, but does not keep long.

11. The *Summer Pearmain* is an oblong fruit, striped with red next the sun; the flesh is soft, and in a short time is mealy, so that it is not greatly esteemed.

12. The *Kentish Fill-Basket* is a species of Codlin, of a large size, and somewhat longer shaped than the Codlin; this ripens a little later in the season, and is generally used for baking, &c.

13. The *Transparent Apple*: this was brought to England a few years since, and was esteemed a curiosity; it came from Petersburgh, where it is affirmed to be so transparent, as that the kernels may be perfectly seen, when the Apple is held to the light; but, in this country, it is a mealy insipid fruit, not worth propagating.

14. *Loan's Pearmain*: this is a beautiful fruit, being of a middling size; the side next the sun is of a beautiful red, and striped with the same colour on the other; the flesh is vinous, but as it soon grows mealy, it is not greatly esteemed.

15. The *Quince Apple*: this is a small fruit, seldom larger than the Golden Pippin, but is in shape like the Quince, especially towards the stalk; the side next the sun is of a russet colour, on the other side inclining to yellow: this is an excellent Apple for about three weeks in September, but will not keep much longer.

16. The *Golden Renette* is a fruit so well known in England, as to need no description; this ripens about Michaelmas, and for about a month is a very good fruit, either for eating raw or baking.

17. The *Aromatic Pippin* is also a very good Apple: it is about the size of a Nonpareil, but not so flat, it is a little longer; the side next the sun is of a bright russet colour: the flesh is breaking, and has an aromatic flavour. It ripens in October.

18. The *Hertfordshire Pearmain*, by some called the Winter Pearmain: this is a good sized fruit, rather long than round, of a fine red next the sun, and striped with the same colour on the other side; the flesh is juicy, and stews well, but is not esteemed for eating by any nice palates. This is fit for use in November and December.

19. The *Kentish Pippin* is a large handsome fruit, of an oblong figure; the skin is of a pale green colour; the flesh is breaking, and full of juice, which is of a quick acid flavour. This is a very good kitchen fruit, and will keep till February.

20. The *Holland Pippin* is larger than the former; the fruit is somewhat longer, the skin of a darker green, and the flesh firm and juicy. This is a very good kitchen fruit, and will keep late in the season.

21. The *Monstrous Renette* is a very large Apple, of an oblong shape, turning red toward the sun, but of a dark green on the other side; the flesh is apt to be mealy, so it is not much valued by those who are curious, and only preserved for the magnitude of the fruit.

22. The *Embroidered Apple* is a pretty large fruit, somewhat shaped like the Pearmain, but the stripes of red are very broad, from whence the gardeners have given it this title: it is a middling fruit, and is commonly used as a kitchen Apple, though there are many better.

23. The *Royal Russet*, by some called the Leather Coat Russet, on account of the deep russet colour of the skin; this is a large fair fruit, of an oblong figure, broad towards the base; the flesh is inclinable to yellow. This is one of the best kitchen Apples we have, and is a very great bearer: the trees grow large and handsome, and the fruit is in use from October till April, and is also a pleasant fruit to eat.

24. *Wheeler's Russet* is an Apple of a middling size, flat, and round; the stalk is slender, the side next the sun of a light russet colour, and the other side inclining to a pale yellow, when ripe: the flesh is firm, and the juice has a very quick acid flavour, but is an excellent kitchen fruit, and will keep a long time.

25. *Pile's Russet* is not quite so large as the former, but is of an oval figure, of a russet colour to the sun, and of a dark green on the other side: it is a very firm fruit, of a sharp acid flavour, but is much esteemed for baking, and will keep sound till April, or later, if they are well preserved.

26. The *Nonpareil* is a fruit pretty generally known in England, though there is another Apple which is frequently sold in the markets for it, which is what the French call Haute-bonne: this is a larger fairer fruit than the Nonpareil, more inclining to yellow; the russet colour brighter, and it is earlier ripe, and sooner gone; this is not so flat as the true Nonpareil, nor is the juice so sharp, though it is a good Apple in its season; but the Nonpareil is seldom ripe before Christmas; and where they are well preserved they will keep till May perfectly sound; this is justly esteemed one of the best Apples that have been yet known.

27. The *Golden Pippin* is a fruit almost peculiar to England; there are few countries abroad where this succeeds well, nor do they produce so good fruit in many parts of England as were to be wished; which, in some measure, is owing to their being grafted on free stocks, which enlarges the fruit, but renders it less valuable, because the flesh is not so firm, nor the flavour so quick, so is apt to be dry and mealy; therefore this should always be grafted upon the Crab stock, which will not canker like the others, and though the fruit will not be so fair to the sight, yet it will be better flavoured and keep longer.

There are yet a great variety of Apples, which, being inferior to those here mentioned, I have omitted, as those which are here enumerated will be sufficient to furnish the table and the kitchen, during the whole season of these fruits; so that where these sorts can be had, no person of taste will eat the other.

I shall here mention some of the Apples which are chiefly preferred for the making of Cyder, though there are in every Cyder country, new sorts frequently obtained from the kernels; but these have, for some years, been in the greatest esteem.

1. The *Red-streak*.
2. *Devonshire Royal Wilding*.
3. The *Whitsour*.
4. *Herefordshire Under Leaf*.
5. *John Apple*, or *Deux-annes*.
6. *Everlasting Hanger*.
7. *Gennet Moyle*.
8. In Herefordshire, according to Mr. Marshall,* the *Stire* stands first in estimation as a Cyder fruit. It is somewhat below the middle size; the form rather flat; the colour pale yellowish white, with sometimes a faint blush on one side; the flesh tolerably firm; the flavour, when fully ripe, fine. This celebrated fruit is going off.

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* Gloucestersh. 2. 251.

9. The *Hagloe Crab* is at present next in esteem. It was produced about seventy years ago, (1719) in a nursery, among other stocks raised from the seed, by Mr. Bellamy, of Hagloe, in Gloucestershire, grandfather of the present Mr. Bellamy, near Ross in Herefordshire, who draws from trees grafted with scions from this stock a liquor, which for richness, flavour, and price on the spot, exceeds every other. The fruit is nearly white, with a yellowish cast when fully ripe, sometimes freckled with red on one side: more oblong than the Stire Apple: soft and woolly, but not dry; with a sheer, but when fully ripe, sweet juice; flavour like that of the Cashew Apple.

10. The *Golden Pippin* is in high estimation.

11. The *Old Redstreak* is yet in being. Fruit small, roundish, pale-yellow with numerous faint-red streaks; flesh firm, full of juice, and when ripe finely flavoured. Little, if any genuine Redstreak Cyder, is now made; and it probably never was equal to that from either of the preceding. The tree is of a singularly awkward growth; crooked, reclining, ragged, and unsightly.

12. The *Woodcock*, another old favourite, is now going off. Fruit above the middle size: form somewhat oblong, set on a long footstalk: colour of the Red-streak, with some dark blood-red streaks on one side: flesh remarkably fine. Tree large and strongly featured, forming large boughs in the Pear-tree manner.

13. Other favourite Cyder Apples are—the *Must*, of which there are three varieties.

14. The *Pauson*: middle-sized and green.

15. The *Royal Wilding*: large and white.

16. The *Dymmock Red*: middle-sized and red.

17. The *Coccagee*: above the middle size; greenish white with an orange blush; well fleshed and highly flavoured.

Russets of various kinds, particularly the—

18. *Longney*. 19. *Bromley*. 20. *Foxwhelp*. 21. *Red*. 22. *Crab*. 23. *Quecning*; all large red fruit.

These will yield in their turn to other varieties; and it is now a general opinion, that Apples which are the creatures of art and cultivation, cannot be preserved beyond a certain period.

Mr. Grimwood, a nurseryman of eminence at Kensington, is of opinion that it is not a decline in the quality of the fruit, but in the tree, owing either to want of health, the season, the soil, the mode of planting, or to the stock which they are grafted on, being too often raised from the seed of Apples in the same place or county. It appears, he says, from the ablest men in his profession, that they never found a real decline in any one kind of fruit, but from the above causes.*

The law of nature, Mr. Marshall observes, though it suffer man to improve the fruits which are given us, appears to have set bounds to his art, and to have numbered the years of his creations Artificial propagation cannot preserve the varieties in perpetuity. A time arrives, when they can be no longer propagated with success. All the old Cyder-fruits are now lost, or else so far on the decline, as to be deemed irrecoverable.

The popular idea among orchard-men (in Herefordshire) is, that the decline of the old fruits is owing to a want of fresh grafts from abroad; under a notion that the highest-flavoured Apples grow there, in a state of nature, as the Crab does in this island. It scarcely needs to be observed that this is a gross error.

That the first improved fruits of our ancestors were fetched from the continent is highly probable.† Mr. Lightfoot informs us, that the Apple is remarkable for its longevity; and that it is said

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* Bath Papers, 4. 242. † Gloucestersh. 2. 246.

some trees in Herefordshire have lived a thousand years. This report is transcribed from Haller, without acknowledgment, as is usual with Mr. Lightfoot. Haller quotes *Hereford Orchards*, a book or pamphlet, which I do not recollect having seen.* But no one, I presume, will be disposed to admit such a report, unless we could have better evidence than mere tradition.

According to Stow, Carps and Pippins were brought into England by Mascall. It was the plain industry, says Mr. Evelyn,* of one (Richard) Harris, a fruiterer to King Henry the Eighth, that the fields and environs of about thirty towns in Kent only, were planted with fruit, (from Flanders) to the universal benefit, and general improvement of that county to this day; as by the noble example of my Lord Scudamore, and of some other publick-spirited gentlemen in those parts, all Herefordshire is become, in a manner, but one intire orchard.

Lord Scudamore was ambassador to the court of France in the time of King Charles the First; and having collected in Normandy scions of Cyder-Apple trees, when he returned to England, encouraged the grafting them throughout the county of Hereford.†

But these and others were partial introductions. There can be no doubt but that the Apple has been cultivated in England time immemorial for deserts, for the kitchen, and for cyder.

It is probable that the sorts originally imported have long ago been lost, and though we have still some Apples by the same name with those in Parkinson, (1629) yet it is by no means certain that they are the same fruit; and many of the numerous varieties we are at present possessed of, were raised from seed in this country.‡

Mr. Knight observes,§ that the existence of every variety of Apple appears to be confined to a certain period; that no one of them now cultivated seems to be more than two hundred years old; and that all efforts which have been hitherto made to propagate healthy trees of those varieties which have been long in cultivation, have been entirely unsuccessful: but of this more under the head of Propagation and Culture.

Species 5. *Chinese Apple Tree.* (Pyrus Spectabilis.)

The Chinese Apple tree, when it blossoms in perfection, answers truly to the name of *spectabilis*: a more showy tree can scarcely be introduced to decorate the ornamental plantation. It blossoms about the end of April or beginning of May. The flowers are large, of a pale red when open, and semi-double; the buds are of a much deeper hue. The fruit is of little account, and but sparingly produced. Trees of this species are to be met with in some gardens twenty or thirty feet high.‖ Cultivated in 1780, by John Fothergill, M. D.¶

Species 6. *Siberian Crab Tree.* (Pyrus Prunifolia.)

This has a strong woody stem, sending out many side branches, and covered with a smooth brown bark. The leaves are shaped like those of the Cherry-tree: they are of a deep green on their upper side, but paler on their under, slightly serrate, and on long footstalks. The flowers come out in bunches from the side of the branches on long slender peduncles; the petals are white, and shaped like those of the Pear-tree: they appear in April, and are succeeded by roundish fruit, about the

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* Pomona, Pref.
† Gibson's View of the Churches of Dore and Home-Lacy.
‡ Marsh. Gloc. 2. 248.
§ Treatise on the Culture of the Apple and Pear, 1797, p. 7, 9.
‖ Curtis.
¶ Hort. Kew.

size of large Duke Cherries, changing to a yellowish colour variegated with red, of a very austere taste, decaying like the fruit of the Medlar, and then more palatable.

It is supposed to be a native of Siberia; and bore fruit in the botanic garden at Chelsea before the year 1760.*

Species 7. *Small-fruited Crab Tree.* (Pyrus Baccata.)

This is a tree with even branches. Leaves like those of Cornus, ovate, finely serrate, even on both sides. Petioles the length of the leaf, at the base connecting two linear lanceolate stipules. Peduncles four, filiform, even, axillary, clustered, quite inferior, globular, smooth, small. Petals sessile, oval, concave, white, biggish. Stamens twenty, shorter than the pistils: which are shorter than the corolla. Fruit roundish, five-celled, red. Seeds in each cell two, callous. Calyx minute, deciduous.†

Pallas describes the roots as striking deep, and throwing up abundance of suckers, the trunk scarcely three or four feet high, seldom thicker than the human arm, commonly twisted, covered with a rugged, ash-coloured bark, full of chinks; the wood whitish with grey stripes; the whole forming a spheroidal head, a fathom or a little more in height: the leaves ovate-acuminate, serrate, smooth, on long petioles, and somewhat pendulous; petioles subpubescent; stipules bristle-shaped, slender. Umbels from four to eight-flowered, accompanied with leaves, on very long slender even peduncles. Fruit a pome, the size of a small Cherry, on a long peduncle, globular, green but turning yellow, and more or less tinged with red; five-celled, with two oblong sharp seeds in each cell: the pulp is reddish with an acid juice, which is used for making Quas and Ponch in Siberia, where it grows naturally, and is common about the lake Baikal and in the country beyond it, in Dauria, and as far as Ircut; but not in other parts of that extensive country: it affects the banks of rivers, and low spots near them; flowering in May, and ripening its fruit in August and September.‡ With us it flowers in April; and was introduced in 1784, by Mr. John Græfer.§

Species 8. *Sweet-scented Crab Tree.* (Pyrus Corossania.)

Umbel on smooth peduncles. Calyxes smooth on the outside; tomentose within. Leaves like those of the Apple, but more smooth, and more finely serrate.‖

The leaves of this are longer and narrower, and are cut into acute angles on their sides. The flowers have a fragrant odour, perfuming the North American woods in their season. The inhabitants plant them for stocks to graft other Apples upon.

Kalm says, that this tree is rather scarce in New Jersey, but plentiful in Pensylvania.

Gronovius first remarked it in Virginia. They frequently plant it near their farms, on account of the fine smell which the flowers afford, somewhat like the Raspberry. They expand in the beginning of May. The fruit is small, sour, and unfit for any thing but to make vinegar of. It lies under the trees all winter, acquires a yellow colour, and seldom begins to rot till spring comes on.

It flowers here in May; and appears by Furber's catalogue to have been cultivated here in ¶1724.

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* Miller's Figures. † Linn. Mant. ‡ Fl. Ross. p. 23.
§ Hort. Kew. ‖ Linn. Spec. ¶ Hort. Kew.

Species 9. *Narrow-leaved Crab Tree.* (Pyrus Angustifolia.)

Native of North America. It flowers here in May; and was cultivated in 1750, by Mr. Christopher Gray,* nurseryman at Fulham.

Species 10. *Willow-leaved Crab Tree.* (Pyrus Salicifolia.)

This is a low bushy tree, a fathom or a fathom and half in height, branched very much, and shooting up from the root. Trunk seldom more than an inch and half in diameter; with a thin brownish ash-coloured bark, and a white, uniform, and very hard wood, polishing like bone. Leaves in bundles as it were on the shoots, but scattered alternately on the thorny branches, attenuated into the petiole, lanceolate, stiffish, for the most part quite entire, subserrate towards the tip, covered with a smooth knap, dusky green above, glaucous hoary underneath. Stipules none. Stamens about seventeen. Fruit solitary or two together, turbinate, subvillose, attenuated into a cylinder at the base, rounded above. Seeds in each of the five cells two, ovate-acute, flat on one side, of a yellow-testaceous colour. It flowers at the end of April, and perfects its fruit in June; but the fruit is small and of no value.

Native of Siberia, in the sandy desert between the rivers Terec and Cuma, &c. on Caucasus, and in Persia.† Introduced in 1780, by Peter Simon Pallas, M.D.‡

Some modern authors have united to this genus several species of *Mespilus* and *Crataegus*; but I have followed Linnæus, fully aware that there is no end to these changes in natural orders.

CULTURE.

The ripening of Pears may be accelerated by the method of pruning and managing these trees, which is greatly improved within the space of a few years past; for if we look into the directions which are given by the best writers on this subject, we shall soon discover how little they knew fifty years ago, of the true method of pruning and managing most sorts of fruit-trees, scarce one of them making any difference in the management of the different kinds of fruit.

Pears are propagated by budding or grafting them upon stocks of their own kind, which are commonly called free stocks, or upon Quince stocks, or Whitethorn, upon all which these fruits will take; but the latter sort of stock is now seldom used, because they never keep pace in their growth with the fruit budded or grafted upon them; as also because the fruit upon such stocks are commonly drier, and more apt to be stony, than when they are upon Pear stocks. Quince stocks are greatly used in the nurseries for all sorts of Pears which are designed for dwarfs or walls, in order to check the luxuriancy of their growth, so that they may be kept within compass better than upon free stocks. But against the general use of these stocks, for all sorts of Pears indifferently, there are very great objections: First, Because some sorts of Pears will not thrive upon these stocks, but in two or three years decay, or at most will but just keep alive. Secondly, Most of the sorts of hard breaking Pears are rendered stony, and good for little; so that whenever any of these sorts are thus injudiciously raised, the fruit, although the kind be ever so good, is condemned as good for nothing by such as are not well acquainted with it, when the fault is entirely owing to the stock on which it

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* Hort. Kew. † Pallas. ‡ Hort. Kew.

was grafted. On the contrary, most melting buttery Pears are greatly improved by being upon Quince stocks, provided they are planted on a strong soil; but, if the ground be very dry and gravelly, no sort of Pear will do well upon Quince stocks.

The distance which these trees should be planted either against walls or espaliers, must not be less than forty feet; for if they have not room to spread on each side, it will be impossible to preserve them in good order, especially those on free stocks, for the more these trees are pruned, the more they will shoot; and, as I said before, many sorts of Pears produce their blossom-buds first at the extremity of the former year's shoots, so that when they are shortened, the fruit will be cut away, and this cannot be avoided, where the trees have not room allowed in their first planting.

This distance, I doubt not, will be objected to by many who have not fully attended to the growth of these trees, especially as it hath been the general practice of most gardeners to plant these trees at less than half the distance which is here mentioned; but, whoever will be at the trouble to view any of these trees which have been some years standing, they will always find, if by accident one of these trees has been planted against a building, where the branches have had room to spread, that this tree has produced more fruit than twelve trees which have been crowded close, and have not room for their branches to extend. There are some Pear-trees now growing, which spread more than fifty feet in length, and are upwards of twenty feet high, which produce a much greater quantity of fruit than (if there had been three trees in the same room), they would have done, as there are examples enough to prove, where trees are planted against houses and the ends of buildings at about twelve feet, or much less distance, because there is height of walling for them to grow, which is the reason commonly given by those who plant these trees so close together. But one tree will bear more fruit, when the branches are trained horizontally, than three or four trees, whose branches are led upright; and there never can be any danger of the upper part of the wall being left naked or unfurnished; for I have seen a Pear-tree which has spread more than fifty feet in width, and covered the wall upwards of thirty-six feet in height; this was a summer Boucrétien Pear, and was extremely fruitful, which rarely happens to this sort when they are not allowed a large share of room. The finest tree of this sort of Pear, which I have ever seen, was a large standard-tree in my own possession, whose stem was not more than ten feet high, where the branches came out regularly on every side, and extended near thirty feet from the trunk, many of which were by the weight of the fruit in summer brought down to the ground, so they were obliged to be supported with poles all around the tree towards the extremity of the branches, to prevent their lying upon the ground; and this tree had its branches so disposed as to form a natural parabola of forty feet in height, bearing from the lowest to the highest branches; so that in a kindly season, when the blossoms escaped the frost, it has produced upwards of two thousand Pears, which were much better flavoured than any of the same sort which I have yet tasted. This instance I mention, only to shew how much one of these trees will spread, if proper room be allowed it; and also to observe, that as the branches of this tree had never been shortened, they were fruitful to their extremities. This shews the absurdity of the French gardeners, who do not allow more than ten or twelve feet distance to these trees; and some of their most improved writers on this subject have advised the planting an Apple-tree between the Pear-trees, where they are allowed twelve feet; and yet these authors afterwards say, that a good Pear-tree will shoot three feet each way in one year; therefore, according to their own observation, the trees so planted will have their branches meet together in two or three years at most, and what must be the case with such trees in five or six years is not difficult to know. But this method of planting has not been peculiar to the French, for most of the gardens in England have been little better planted. Indeed, those persons who were intrusted with the making and planting most of the English gardens, had little skill of their own, so were obliged to follow the directions of the French gardeners; of whom they

had so great an opinion, as to get their books translated, and to these have added some trifling notes, which rather betray their weakness; for, where they have objected to the little room which their authors had allowed to these trees, they have, at the most, allowed them but three feet more; from which it is plain, they had not considered the natural growth of the trees, and whoever departs from nature, may be justly pronounced an unskilful gardener.

As most of the English gardens have been made and planted by persons of little judgment, it is very rare to find any of them which produce much fruit: for although many of these gardens have been totally altered and new planted, yet they have seldom been much altered for the better: and the possessors have been put to the expence of removing the old trees, also the earth of their borders, and to purchase new trees, which have been planted perhaps a foot or two farther asunder, than the old trees which were removed; so that when the young trees have grown a few years, they were in the same condition as the old, and it will be the loss of so many years to the owner: but this will constantly be the case, when it is the interest of the persons employed, who can sell so many young trees; and the planting of three times the number of trees in a garden more than is proper, may in some measure be ascribed to the same, though in many instances I shall be inclinable to think they have proceeded from ignorance, rather than design.

But where fruit-trees have been thus injudiciously planted, if the stocks are healthy and good, the best way to recover this loss is to dig up two or three, and leave every third or fourth tree, according to the distance which they were planted, and spread down the branches of those which are left horizontally; I mean, all such as are capable of being so brought down: but those which are too stubborn for this, should be cut off near the stem, where there will be new shoots enough produced to furnish the wall or espalier; and if the sort of fruit is not the same as desired, the young branches may be budded the same summer, or grafted the following spring, with any other sort of Pear, and hereby many years may be saved: for one of these old trees so budded or grafted, will spread to a much greater length, and produce more fruit, when thus managed, in three years, than a new tree will in ten or twelve, especially if the ground is mended. This is a method which I have practised with great success, where I have been employed to mend the blunders of these great gardeners, as they are styled, and hereby the walls and espaliers have been well furnished in a few years.

The manner of preparing these trees for planting is the same as has been directed for other fruit-trees, viz. to cut off all the small fibres from the roots, and to shorten some of the longest roots, and cut off all the bruised ones, or such as shoot downright; this being done, you should plant them in the places intended at the before-mentioned distance. The best time to plant these trees (if upon a middling or dry soil) is in October or November, leaving their heads on till spring, which should be fastened either to the walls or stakes, to prevent the wind from disturbing their roots; and in the beginning of March their heads should be cut off in the manner already directed for Peaches and other fruit-trees; observing also to lay some mulch upon the surface of the ground about their roots when they are planted, as has been several times already directed for other trees; but in wet ground the trees may be planted in February, or the beginning of March, at any time before the buds are much swelled, but these may be cut down when they are planted.

The first summer after planting, the branches should be trained to a wall or espalier (against which they are planted) in a horizontal position, as they are produced, without shortening them; and the Michaelmas following, some of these shoots should be shortened down to five or six eyes, in order to obtain a sufficient quantity of branches, to furnish the lower part of the wall or espalier; but the shoots ought not to be shortened, unless where there is a want of branches to fill a vacancy; therefore the less a knife is used to these trees, the better they will succeed; for whenever the shoots are stopped, it occasions the buds immediately below the cut to send forth two or more

shoots, whereby there will be a confusion of branches, and rarely any fruit is produced with this management.

The distance which the branches of Pears should be trained, must be proportioned to the size of their fruit; therefore such sorts whose fruit are small, may be allowed five or six inches, but the larger sorts must not be less than seven or eight inches asunder. If this be duly observed, and the branches carefully trained horizontally as they are produced, there will be no occasion for so much cutting as is commonly practised on these trees, which, instead of checking their growth, does, on the contrary, cause them to shoot the stronger.

It is very surprising to read the tedious methods, which most of the writers on fruit-trees have directed for pruning these trees; for, by their prolix and perplexed methods, one would imagine they had endeavoured to render themselves as unintelligible as possible; and this, I am sure, may be affirmed, that it is next to impossible for a learner ever to arrive at any tolerable skill in pruning by the tedious and perplexed directions which are published by Monsieur Quintiny, and those who have copied from him; for, as these have all set out wrong in the beginning, by allowing their trees less than half the distance which they should be planted, they have prescribed rules to keep them within that compass, which are the most absurd, and contrary to all reason, therefore should not be practised by those persons who are desirous of having plenty of fruit.

I shall therefore only lay down a few necessary directions for pruning and managing these trees, which shall be done in as few words as possible, that a learner may the more easily understand it, and which (together with proper observations) will be sufficient to instruct any person in the right management of them.

Pear-trees generally produce their blossom-buds first at the extremity of the last year's shoots, so that if these are shortened, the blossoms are cut off; but this is not all the damage, for (as I before said) this occasions the buds immediately below the cut to put forth two or more shoots, whereby the number of branches will be increased, and the tree crowded too much with wood; besides, those buds, which by this management produce shoots, would have only produced cursons or spurs, upon which the blossom-buds are produced, if the leading branch had not been shortened; therefore these should never be stopped, unless to furnish wood to fill a vacancy.

It is not necessary to provide a new supply of wood in Pear-trees, as must be done for Peaches, Nectarines, &c. which only produce their fruit upon young wood; for Pears produce their fruit upon cursons or spurs, which are emitted from branches which are three or four years old; which cursons continue fruitful many years, so that, where these trees have been skilfully managed, I have seen branches which have been trained horizontally upwards of twenty feet from the trunk of the tree, and have been fruitful their whole length. And if we do but carefully observe the branches of a healthy standard-tree, which has been permitted to grow without pruning, we shall find many that are ten or twelve years old, or more, which are very full of these cursons, upon which a good number of fruit is annually produced.

During the summer season these trees should be often looked over to train in the shoots, as they are produced, regularly to the wall or espalier, and to displace fore-right and luxuriant branches as they shoot out, whereby the fruit will be equally exposed to the air and sun, which will render them more beautiful and better tasted than when they are shaded by the branches; and by thus managing the trees in summer, they will always appear beautiful, and in winter they will want but little pruning.

Where Pear-trees are thus regularly trained without stopping their shoots, and have full room for their branches to extend on each side, there will never be any occasion for disbarking the branches, or cutting off the roots (as hath been directed by several writers on gardening); which methods, however

they may answer the intention for the present, yet will certainly greatly injure the trees, as must all violent amputations, which should ever be avoided as much as possible on fruit-trees; and this, I am sure, can never be wanted, where trees have been rightly planted, and regularly trained, while young.

The season for pruning these trees is any time after the fruits are gathered, until the beginning of March; but the sooner it is done after the fruit is gathered, the better, for reasons already given for pruning of Peach-trees; though indeed the deferring of these until spring, where there are large quantities of trees to prune, is not so injurious to them, as to some tender fruits; but if the branches are regularly trained in summer, and the luxuriant shoots rubbed off, there will be little left to do to them in winter.

All the sorts of Summer Pears will ripen very well either on standards, dwarfs, or espaliers, as will all Autumn Pears upon dwarfs or espaliers; but, where a person is very curious in his fruit, I would always advise the planting them against espaliers, in which method they take up but little room in a garden, and, if they are well managed, appear very beautiful; and the fruit is larger and better tasted than those produced on dwarfs, as has been already observed; but some of the Winter Pears must be planted againt east, south-east, or south-west walls, otherwise they will not ripen well in England in bad seasons.

But although this may be the case with some of the late Winter Pears in very bad seasons, yet, in general, most sorts of them will ripen extremely well in all warm situations, when they are planted in espalier, and the fruit will be better flavoured than that which grows against walls, and will keep much longer good; for, as the heat against walls which are exposed to the sun will be very great at some times, and at others there will be little warmth, all fruit which grow near them, will be hastened unequally, and therefore are never so well flavoured as the same sorts are which ripen in the open air; and all the fruit, which is ripened thus unequally, will decay much sooner than those which ripen gradually in the open air; therefore those Winter Pears which grow in espalier, may be kept six weeks longer than those which grow against walls, which is a very desirable thing; for to have plenty of these fruit at a season when it is very rare to find any other fruit to supply the table but Apples, is what all lovers of fruit must be greatly pleased to enjoy; which is what may be effected by planting many of the late sorts in espalier, where, although the fruit will not be so well coloured as those from the walls, yet they will be found exceeding good. When the Besi de Chaumontelle came first to England, the trees were planted in espalier, and some of them not on a very good soil, or in a warm situation, and yet from these trees I have eaten this Pear in great perfection in April, and sometimes it has kept till May; whereas, all those which have been since planted against walls ripen their fruit by the beginning of November, and are generally gone by the middle of December; nor are the latter so well tasted as those off the espaliers.

The Virgoleuse and St. Germain, as also the Colmar, are esteemed the most difficult sorts to ripen their fruit, yet these I have eaten in great perfection from espaliers, and often from standard-trees, where they grew upon a warm soil; but the fruit was much smaller on the standard-trees than those of the same sorts which grew against walls or espaliers, but they were full as well flavoured, and some of these sorts I have eaten good in April, which is two months later than they usually keep; but yet I would not advise the planting these late Pears in standard-trees, because they should hang very late on the trees in autumn, at which season the winds are generally very high; and these standard-trees being much exposed, the fruit is often blown off the trees before they are ripe; and those of them, which may hang on the trees, are frequently bruised by being forced against the branches by the winds, so that they seldom keep well. What I mentioned this for, is to prove, that these Pears will ripen very well without the assistance of a wall; so that if they are planted in

espaliers where the trees are kept low, the fruit will not be so much exposed to the strong winds in autumn as those on the standards, therefore can be in no danger of the fruit coming to perfection; and as the trees in espaliers will be constantly pruned, and managed in the same manner as those against walls, the fruit will be as large on those trees; therefore, where a person has a warm situation and a kindly soil, I would not advise the being at an expence to build walls on purpose for Pears, but to plant them against espaliers: and where there is any one who is very curious in having plenty of these fruit, and will be at the expence to procure them, I should advise having a sufficient quantity of Reed mats made to fix up against the back of the espalier in the spring, when the trees are in blossom, which will screen them from cold winds, and preserve the tender fruit until they are past danger, when the Reeds may be taken down, and put under a shed to preserve them from the weather; and if the autumn should prove bad, these Reeds may be fixed up again, which will forward the ripening of the fruit, and also prevent the winds from blowing down, and bruising it.

But after the fruit is set and growing, there will be farther care necessary in order to have the fruit good; for it is not enough to have preserved a good crop of fruit on the trees, and then leave them entirely to nature during the season of their growth, but there will require some skill and attendance on the trees to help nature, or supply the deficiency of seasons; for beside the pruning and training trees in the manner before directed, there will also be wanting some management of their roots, according to the nature of the soil, and the difference of seasons. In all strong land, where the ground is apt to bind very hard in dry weather, the surface of the borders should be now and then forked over to loosen the earth, which will admit the showers and dews to penetrate and moisten the ground, and be of great service to the trees and fruit, and also prevent the growth of weeds. And if the soil is light and dry, and the season should prove hot and dry, there should be large hollows made round the stems of the trees to hold water; and into each of these there should be poured eight or nine pots of water, which should be repeated once in a week or ten days during the months of June and July, if the season should continue dry. There should also be some mulch laid over the surface of these hollows, to prevent the sun and air from drying the ground. Where this is practised, the fruit will be kept constantly growing, and prove large and plump; whereas, if this is omitted, the fruit will often be small, grow crooked, crack, and fall off from the trees. For if the fruit is once stinted in their growth, and rain should fall plentifully after, it will occasion a great quantity of fruit to fall off the trees, and those which never receive any check in their growth: and it is from this cause, that some years the fruit in general decays before the usual time. For after it has been for some time stinted in its growth, and then the season proves favourable, whereby it receives a sudden growth, it becomes so replete with juice, as to distend the vessels too suddenly, so that they will not be firm, which occasions their decay; therefore it is always best to keep the fruit constantly in a growing state, whereby it will acquire a proper size, and be rendered better flavoured.

There will also be required some dressing to the ground near the fruit-trees; but this should be different, according to the nature of the soil; if the land is warm and dry, then the dressing should be of very rotten dung, mixed with loam; and if this is mixed six or eight months before it is laid upon the borders, and three or four times turned over, it will be the better; as will also the mixture, if it is made with neat's or hog's dung, both which are colder than horse-dung, so more proper for hot land. But in cold stiff land, rotten horse dung, mixed with light sandy earth, or sea-coal ashes, will be the most proper, as this will loosen the ground and add a warmth to it.

These dressings should be repeated every other year, otherwise the trees will not thrive so well, nor will the fruit be so good. For, notwithstanding what many persons have advanced to the contrary, yet experience is against them; for the finest fruit in England, both as to size and flavour, is

produced on land which is the most dunged and worked. Therefore I would advise trenching the ground about the fruit-trees very well every winter, for I am sure they will find it answer their expectations who shall practise this method. And where the ground in the quarters is well dressed and trenched, the fruit-trees will partake of the benefit; for as the trees advance in their growth, their roots are extended to a great distance from their stems; and it is chiefly from the distant roots that the trees are supplied with their nourishment: therefore dressing the borders only, will not be sufficient for fruit-trees which are old.

In gathering of Pears, great regard should be had to the bud which is formed at the bottom of the foot-stalk, for the next year's blossoms; which, by forcing off the Pear before it be mature, is many times spoiled; for while the fruit is growing, there is always a bud formed by the side of the foot-stalk upon the same spur, for the next year's fruit; but when the Pears are ripe, if they are gently turned upward, the foot-stalk will readily part from the spur, without injuring the bud.

The season for gathering all Summer Pears is just as they ripen, for none of these will remain good above a day or two after they are taken from the tree; nor will many of the Autumn Pears keep good above ten days or a fortnight after they are gathered. But the winter fruits should hang as long upon the trees as the season will permit; for they must not receive frost, which will cause them to rot, and render their juices flat and ill tasted; but if the weather continue mild until the end of October, it will then be a good season for gathering them in, which must always be done in dry weather, and when the trees are perfectly dry.

In doing this you ought carefully to avoid bruising them, therefore you should have a broad flat basket to lay them in as they are gathered; and when they are carried into the store-room, they should be taken out singly, and each sort laid up in a close heap on a dry place, in order to sweat, where they may remain for ten days or a fortnight; during which time the windows should be open to admit the air, in order to carry off all the moisture which is perspired from the fruit: after this, the Pears should be taken singly, and wiped dry with a woollen cloth, and then packed up in close baskets, observing to put some Wheat straw in the bottoms, and round the sides of the baskets, to prevent their bruising against the baskets. And if some thick soft paper is laid double or treble all round the basket, between the straw and the Pears, this will prevent the Pears from imbibing the musty taste which is communicated to them by the straw, when they are contiguous; which taste often penetrates through the skin so strongly, that when the fruit is pared, the taste will remain. You should also observe to put but one sort of fruit into a basket, lest by their different fermentations, they should rot each other; but if you have enough of one sort to fill a basket which holds two or three bushels, it will be still better. After you have filled the baskets, you must cover them over with Wheat straw very close, first laying a covering of paper two or three times double over the fruit, and fasten them down; then place these baskets in a close room, where they may be kept dry and from frost; but the less air is let into the room, the better the fruit will keep. It will be very necessary to fix a label to each basket, denoting the sort of fruit therein contained, which will save the trouble of opening them, whenever you want to know the sorts of fruit; besides, they ought not to be opened before their season to be eaten, for the oftener they are opened and exposed to the air, the worse they will keep. I do not doubt but this will be objected to by many who imagine fruit cannot be laid too thin; for which reason, they make shelves to dispose them singly upon, and are very fond of admitting fresh air, whenever the weather is mild, supposing it very necessary to preserve the fruit; but the contrary of this is found true by those persons who have large stocks of fruit laid up in their store-houses in London, which remain closely shut up for several months, in the manner before related; and when these are opened, the fruit is always found plumper and sounder than any of those fruits which were preserved singly upon shelves, whose skins are always shrivelled

and dry. For (as Mr. Boyle observes) the air is the cause of putrefaction; and, in order to prove this, that honourable person put fruits of several kinds into glasses where the air was exhausted, in which places they remained sound for several months, but, upon being exposed to the air, rotted in a very short time after; which plainly shews the absurdity of the common method now used to preserve fruit.

All the sorts of Apples are propagated by grafting or budding upon the stocks of the samekind, for they will not take upon any other sort of fruit tree. In the nurseries there are three sorts of stocks generally used to graft Apples upon: the first are called free stocks; these are raised from the kernels of all sorts of Apples indifferently, and sometimes they are also termed Crab stocks; for all those trees which are produced from the seeds before they are grafted, are termed Crabs without any distinction; but, I should always prefer such stocks as are raised from the kernels of Crabs, where they are pressed for verjuice; and I find several of the old writers on this subject of the same mind. Mr. Austen, who wrote above a hundred years ago, says, "The stock which he accounts best for Apple grafts is the Crab, which is better than sweeter Apple-trees to graft on, because they are usually free from canker, and will become very large trees; and, I conceive, will last longer than stocks of sweeter Apples, and will make fruits more strong and hardy to endure frost;" and it is very certain, that by frequently grafting some sorts of Apples upon free stocks, the fruits have been rendered less firm and poignant, and of shorter duration.

The second sort of stock is the Dutch Paradise Apple, or Creeper; these are designed to stint the growth of the trees, and keep them within compass for dwarfs or espaliers.

The third sort is the Paradise Apple, which is a very low shrub, and only proper for trees which are kept in pots, by way of curiosity, for these do not continue long.

Some persons have made use of Codlin stocks for grafting Apples, in order to stint their growth; but as these are commonly propagated by suckers, I would by no means advise the using them; nor would I choose to raise the Codlin-trees from suckers, but rather graft them upon Crab stocks, which will cause the fruit to be firmer, last longer, and have a sharper flavour; and these trees will last much longer sound, and never put out suckers, as the Codlins always do, which, if not constantly taken off, will weaken the trees, and cause them to canker: and it is not only from the roots, but from the knots of their stems, there are generally a great number of strong shoots produced, which fill the trees with useless shoots, and render them unsightly, and the fruit small and crumpled.

The method of raising stocks from the kernels of Crabs, or Apples, is, to procure them where they are pressed for verjuice or cyder, and after they are cleared of the pulp, they may be sown upon a bed of light earth, covering them over about half an inch thick with the same light earth; these may be sown in November or December, where the ground is dry, but in wet ground, it will be better to defer it till February: but then the seeds should be preserved in dry sand, and kept out of the reach of vermin, for if mice or rats can get at them, they will devour the seeds; there should also be care taken of the seeds, when they are sown, to protect them from these vermin, by setting traps to take them, &c. In the spring, when the plants begin to appear, they must be carefully weeded, and if the season should prove dry, it will be of great service to water them two or three times a week; and, during the summer, they must be kept clean from weeds, which, if suffered to grow, will soon over-top the plants, and spoil their growth; if these thrive well, they will be fit to transplant into the nursery the October following, at which time the ground should be carefully digged, and cleansed from the roots of all bad weeds: then the stocks should be planted in rows three feet asunder, and the plants one foot distance in the rows, closing the earth pretty fast to their roots: when the stocks are transplanted out of the seed-bed, the first autumn after sowing, they need

not be headed, but where they are inclined to shoot downward, the tap root must be shortened, in order to force out horizontal roots; if the ground is pretty good in which these stocks are planted, and the weeds constantly cleared away, the stocks will make great progress, so that those which are intended for dwarfs, may be grafted the spring twelve months after they are planted out of the seed-bed; but those which are designed for standards will require two or three years more growth, before they will be fit to graft, by which time they will be upward of six feet high.

The distance which I should choose to allow these trees, should not be less than thirty feet, for such sorts as are of moderate growth (if upon Crab or free stocks): but the larger growing sorts should not be allowed less room than thirty-five or forty feet, which will be found full near enough, if the ground is good, and the trees properly trained; for as the branches of these trees should not be shortened, but trained at their full length, so in a few years they will be found to meet. Indeed, at the first planting, the distance will appear so great to those persons who have not observed the vigorous growth of these trees, that they will suppose they never can extend their branches so far as to cover the espalier; but if these persons will but observe the growth of standard-trees of the same kinds, and see how wide their branches are extended on every side, they may be soon convinced, that as these espalier-trees are allowed to spread but on two sides, they will of course make more progress, as the whole nourishment of the root will be employed in these side branches, than where there is a greater number of branches on every side of the tree, which are to be supplied with the same nourishment.

I shall now treat of the method to plant orchards so as to have them produce the greatest profit. And first, in the choice of the soil and situation for an orchard: the best situation for an orchard is, on the ascent of the gentle hills, facing the south, or south-east; but this ascent must not be too steep, lest the earth should be washed down by hasty rains. There are many persons who prefer low situations at the foot of hills, but I am thoroughly convinced from experience, that all bottoms where there are hills on each side, are very improper for this purpose; for the air is drawn down into these vallies in strong currents, which, being pent in, renders these bottoms much colder than the open situations; and during the winter and spring, these bottoms are very damp and unhealthy to all vegetables; therefore the gentle rise of a hill, fully exposed to the sun and air, is by much the best situation. As to the soil, a gentle hazel loam, which is easy to work, and that does not detain the wet, is the best; if this happens to be three feet deep, it will be better for the growth of the trees, for although these trees will grow upon very strong land, yet they are seldom so thriving, nor are their fruit so well flavoured, as those which grow on a gentle soil; and on the other hand, these trees will not do well upon a very dry gravel or sand, therefore those soils should never be made choice of for orchards.

The ground intended to be planted should be well prepared the year before, by ploughing it thoroughly, and if some dung is laid upon it the year before, it will be of great service to the trees; if in the preceding spring a crop of Peas or Beans is planted on the ground (provided they are sown or planted in rows, at a proper distance, so as that the ground between them is horse-hoed,) it will destroy the weeds, and loosen the ground, so that it will be a good preparation for the trees, for the earth cannot be too much wrought, or pulverized for this purpose: these crops will be taken off the ground long before the season for planting these trees, which should be as soon as possible performed when the trees begin to shed their leaves.

In choosing the trees, I would advise the taking such as are but of two years growth from the graft, and never to plant old trees, or such as are grafted upon old stocks, for it is losing of time to plant these; young trees being always more certain to grow, and make a much greater progress than those which are old. As to pruning the roots, it must be done in the same manner as has been

already directed for the espalier-trees; and in pruning their heads, little more is necessary than to cut out such branches as are ill placed, or that cross each other; for I do not approve the heading of them down, as is by some often practised to the loss of many of their trees.

The distance which these trees should be planted, where the soil is good, must be fifty or sixty feet; and where the soil is not so good, forty feet may be sufficient; but nothing can be of worse consequence than the crowding trees too close together in orchards. And although there may be some who may imagine this distance too great, yet I am sure, when they have thoroughly considered the advantages attending this practice, they will agree with me. Nor is it my own opinion in this affair, for in many of the old writers on this subject, there is often mention made of the necessity for allowing a proper distance to the fruit-trees in orchards, particularly Austen upon planting, before quoted, who says, "He should choose to prescribe the planting these trees fourteen or sixteen yards asunder; for both trees and fruits have many great advantages if planted a good distance one from another." One advantage he mentions is, "The sun refreshes every tree, the roots, body, and branches, with the blossoms and fruits; whereby trees bring forth more fruit, and those fairer and better." Another advantage he mentions is, "That when trees are planted at a large distance, much profit may be made of the ground under and about these trees, by cultivating garden-stuff, commodious as well for sale as housekeeping; as also Gooseberries, Raspberries, Currants, and Strawberries, may be there planted." Again he says, "When trees have room to spread, they will grow very large and great; and the consequences of that will be, not only multitudes of fruits, but also long lasting, and these two are no small advantages." For, says he, men are mistaken, when they say, "the more trees in an orchard, the more fruits; for one or two large trees which have room to spread, will bear more fruits than six or ten (it may be) of those that grow near together, and crowd one another." Again he says, "Let men but observe, and take notice of some Apple-trees, that grow a great distance from other trees, and have room enough to spread both their roots and branches, and they shall see, that one of those trees (being come to full growth) hath a larger head, and more boughs and branches, than (it may be) four, or six, or more, of those which grow near together, although of the same age."

And Mr. Lawson, an ancient planter, advises to plant Apple-trees twenty yards asunder. As the two authors above quoted have written the best upon this subject, and seem to have had more experience than any of the writers I have yet seen, I have made use of them as authorities to confirm what I have advanced; though the fact is so obvious to every person who will make the least reflection, that there needs no proof.

When the trees are planted, they should be staked, to prevent their being shaken, or blown out of the ground by strong winds; but in doing this, there should be particular care taken, to put either straw, haybands, or woollen cloth, between the trees and the stakes, to prevent the trees from being rubbed and bruised, by the shaking against the stakes, for if their bark should be rubbed off, it will occasion such great wounds, as not to be healed over in several years, if they ever recover it.

If the winter should prove very severe, it will be proper to cover the surface of the ground about their roots with some mulch, to prevent the frost from penetrating the ground, which will destroy the young fibres; but this mulch should not be laid on too soon, as has been before mentioned, lest the moisture should be prevented from soaking down to the roots of the trees, nor should it lie on too long in the spring for the same reason; but where persons will be at the trouble to lay it on in frosty weather, and remove it again after the frost is over, that the wet in February may have free access to the roots of the trees, it will do good; and if March should prove dry, with sharp north or east winds, which often happens, it will be proper to cover the ground again with the mulch, to prevent the winds from penetrating and drying the ground, and will be of singular service to the trees. But

I am aware, that this will be objected to by many, on account of the trouble, which may appear to be great: but when it is considered, how much of this business may be done by a single person in a short time, it can have little force, and the benefit which the trees will receive by this management, will greatly recompense the trouble and expense.

As these trees must be constantly fenced from cattle, it will be the best way to keep the land in tillage for some years, that by constant ploughing or digging the ground, the roots of the trees will be more encouraged, and they will make the more progress in their growth: but where this is done, whatever crops are sown or planted, should not be too near the trees, lest the nourishment should be drawn away from the trees; and as in the ploughing of the ground where it is so tilled, there must be care taken not to go too near the stem of the trees, whereby their roots would be injured, or the bark of their stems rubbed off, so it will be of great service to dig the ground about the trees where the plough does not come, every autumn, for five or six years after planting, by which time their roots will have extended themselves to a greater distance.

It is a common practice, in many parts of England, to lay the ground down for pasture, after the trees are grown pretty large in their orchards; but this is by no means advisable, for I have frequently seen trees of above twenty years growth, almost destroyed by horses, in the compass of one week; and if sheep are put into orchards, they will constantly rub their bodies against the stems of the trees, and their grease sticking to the bark, will stint their growth, and in time will spoil them; therefore wherever orchards are planted, it will be much the better method to keep the ground ploughed or dug annually, and such crops put on the ground as will not draw too much nourishment from the trees.

In the pruning of orchard-trees, nothing more should be done, but to cut out all those branches which cross each other, and, if left, would rub and tear off the bark, as also decayed branches, but never shorten any of their shoots. If suckers, or shoots from their stems, should come out, they must be entirely taken off annually; and when any branches are broken by the wind, they should be cut off, either down to the division of the branch, or close to the stem from whence it was produced: the best time for this work is in November, for it should not be done in frosty weather, nor in the spring, when the sap begins to be in motion.

The best method to keep Apples for winter use is, to let them hang upon the trees until there is danger of frost, and to gather them in dry weather, laying them in large heaps to sweat for three weeks or a month; afterwards look them over carefully, taking out all such as have appearance of decay, wiping all the sound fruit dry, and pack them up in large oil-jars, which have been thoroughly scalded and dry, stopping them down close to exclude the external air: if this is duly observed, the fruit will keep sound a long time, and their flesh will be plump; for when they are exposed to the air, their skins will shrink, and their pulp will be soft.

It has been lately made evident, particularly by the experiments and curious remark of T. A. Knight, Esq. that those varieties of the Apple, of which the original trees had perished from old age, could not be made to grow to any purpose. The grafts, he says, grow well for two or three years; but after that become cankered and mossy. When he first observed the unhealthy state of all the young trees of these kinds, he suspected that it arose from the use of diseased grafts taken from young newly grafted trees: but to remove still farther every probability of defect which might be communicated from the old trees, he inserted the young shoots and buds, taken from newly grafted trees, on other young stocks, and repeated this process six times in as many years, each year taking his grafts and buds from those inserted in the year preceding. Stocks of different kinds were also used; some were double grafted, others were obtained from trees which grew from cuttings, and others from the seeds of each kind afterwards inserted in them, under the idea that there might be

something congenial to the fruits in these. The grafts grew tolerably, and equally in all; but there was a want of hardness and elasticity in the wood, and at the end of three or four years all began to canker. This disease is always found in those varieties which have been long in cultivation; and in these it annually becomes more destructive, and evidently arises from the age of the variety; but it often appears to be hereditary. A gravelly or wet soil, a cold preceding summer, or a high exposed situation, add much to its virulence. It is most fatal to young free-growing trees of old varieties; and even the strong shoots of these will be totally destroyed by it, when the old trees growing in the same orchard, and from which the grafts had been taken, were nearly free from the disease. The young stocks, by affording the grafts a preternatural abundance of nourishment, seem to bring on the disease; and transplanting, or a heavy crop of fruit, which check the growth of the tree, diminish its disposition to canker. In middle-aged trees of very old varieties a succession of young shoots is annually produced by the vigour of the stock, and destroyed again in the succeeding winter: the quantity of fruit these produce is in consequence very small. In this disease something more than a mere extinction of vegetable life appears to take place. The internal bark bears marks of something similar to erosion; and this is probably the original seat of the disease, though the wood of the annual shoots is soon tinged to the centre. The canker does not appear to be ever a primary or merely local disease, but to arise from the morbid habit of the plant, and to be incurable by any topical application.

Being after much unsuccessful experience satisfied, that those varieties of the Apple, of which the original trees had long perished from old age, could not be made to grow; Mr. Knight suspected, that grafts taken from very young seedling trees, not yet in a bearing state, could not by any means be made to produce fruit. Having taken cuttings from some of these of two years old, he inserted them in stocks of twenty, which had already produced fruit. He afterwards frequently transplanted, and took every means in his power to make them produce blossoms; but though they grew in rich ground, which probably tended to accelerate their maturity, he did not succeed till the seedling trees were twelve years old, the age at which they usually produce fruit; and then other grafts of the same kind, which had been inserted but three years before, readily blossomed. Other cuttings were inserted in very old stocks, which were regrafted; these grew with excessive vigour, but did not produce blossoms so soon as the others.

From the result of these experiments, and from the general failure of every attempt to propagate every old variety of the Apple, Mr. Knight thinks himself justified in the conclusion, that all Apples, however propagated from the same stock, partake in some degree of the same life, and will attend it in the habits of their youth, their maturity and decay; though they will not be any way affected by any incidental injuries the parent tree may sustain, after they are detached from it. The roots however, and the trunk adjoining them, appear to possess in all trees a greater degree of durability than the bearing branches, having a power of producing new ones, when the old have been destroyed by accident, or even by old age: and grafts taken from scions, which have sprung out of the trunks of old ungrafted Apple and Pear trees, will grow with much greater luxuriance than those taken at the same time from the extremities of the bearing branches. The former in their growth assume the appearance of young seedling stocks, and the shoots of the Pear are, like those, covered with thorns. Those propagated from the bearing branches frequently produce fruit the second year, but the others remain long unproductive. It appears therefore extremely probable, that such trees as the Walnut and Mulberry, which do not produce fruit in less than twenty years, might be rendered fruitful in one third of that time, by being grafted with cuttings taken from the productive branches of an old tree.

Since then the valuable varieties of the Apple and Pear cannot be continued for ever, till new

varieties can be raised equally valuable, let us see whether the duration of the old ones may not be considerably prolonged by art.

Now the life of every tree appears to be greatly prolonged, when its branches are frequently taken off; and there is not the least doubt but that the life of an Apple or Pear might be prolonged to thrice its natural period, by robbing it of its branches as soon as the qualities of its fruit are known; and retaining it as a pollard, or rather as a stool in a coppice, which is felled at regular periods: for these are known to possess a much greater degree of durability, than the same kind of tree in the natural state; and to produce a more vigorous succession of branches during several centuries. It is however probable that after a certain period, each effort of nature will be inferior to the preceding: for timber trees which spring from old stools, are observed to attain only a small stature, with an early maturity and decay. Should any valuable variety of the Apple be retained in the state here described, its branches should be taken off every third or fourth year, and used for grafts, and it should never be suffered to produce fruit or blossoms. Under this mode of treatment, there is little doubt but that the same variety might be propagated through many centuries.

It appears also probable that the latter period of the existence of the Apple-tree would be considerably prolonged in a southern climate, for all the old varieties succeed best in warm situations, and the most diseased flourish with the greatest vigour when trained to a south wall. This mode of culture might probably be adopted with advantage, when new varieties are to be obtained from seed; and the production of these must be the first thing to engage the attention of the planter of the present day.*

For this purpose, Mr. Marshall recommends to elect among the varieties, individuals of the highest flavour: to sow the seeds in a highly enriched seed-bed: to select from among the seedlings the plants wherein the wood and leaves have the best appearance: to transplant these into a rich deep soil, in a good situation, at due distances: letting them remain in this nursery, until they begin to bear.

With the seeds of the fairest, richest, and best flavoured fruit, repeat this process: and at the same time, or in due season, engraft the wood which produced this fruit, on that of the richest, sweetest, best-flavoured Apple: repeating this operation, and transferring the subject under improvement, from one tree and sort to another, as richness, flavour or firmness may require. Continuing this double mode of improvement, until the desired fruit be obtained.†

Such trials are certainly worth making: but it would be difficult to say what might be the issue of them until they are actually made.

When Mr. Knight began to suspect that his endeavours to propagate the old fruits would not be successful, he selected seeds of some of the best kinds, with an intention to propagate new ones: but he soon found that many of the young plants, particularly those from the Golden Pippin, were nearly as much diseased as the trees which produced them. He several times raised three or four plants from seeds taken from one Apple, and when this had been produced by a diseased tree, he had not only as many varieties as there were seeds, but some were much diseased, and others apparently healthy; though the seeds were sown in the same soil, and the plants afterwards grew within two feet of each other in the nursery. Grafts having been inserted from each, retained the habits of the tree from which they were taken. Few, however, if any, appeared to possess a sufficient degree

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* Treatise on the culture of the Apple and Pear, p. 10 to 23.

† Gloucestershire, 4. 249.

of vigour to promise much success in their cultivation, except in very favourable situations, even should their fruit be good.

Having before observed that all the old fruits were free from disease when trained to a south wall, Mr. Knight thought it not improbable that seedling plants raised from them would be equally healthy; and that their blossoms being expanded before those of the neighbouring orchards, they would not be impregnated by the farina of inferior kinds. With a view to try this, he prepared stocks of the best kind of Apple which could be propagated by cuttings, planted them against a south wall, in extremely rich mould, and grafted them with the Stire, Golden Pippin, and a few other fruits, whose time of ripening suited the situation in which he wished to plant. In the course of the ensuing winter the young trees were dug up, and their roots having been retrenched, were planted again in the same places. This mode of treatment had the desired effect of making them produce blossoms at two years old. He suffered only one or two fruits to remain on each tree, which in consequence attained nearly three times their common size, with a very high degree of maturity and perfection; and the appearance of the plants he raised from their seeds so much excelled any he had formerly obtained from the same fruits taken from the orchard, that he thinks he can confidently recommend the method he adopted. He had chosen fruits possessing excellencies and defects of opposite kinds, with a wish to see, either through the industry of bees or his own, the effects of a process similar to what is called by breeders of animals, crossing the breed.

A few days before the blossoms expanded, he opened the petals and destroyed the males in all the blossoms which he suffered to remain of one kind, taking great care to leave the females uninjured: and when these blossoms were fully expanded, he impregnated half of them with farina taken from another kind of fruit, leaving the other half to the care of the bees, which collected about them in great numbers. Every fruit which he impregnated grew rapidly, whilst half of those on the other tree, which remained in their natural state, failed, with every one of those left to the care of the bees. Whence we may conclude that these insects are not so good carriers of the farina of plants, as is generally supposed by naturalists. The plants he obtained from the fruits on which this experiment was made, were certainly the most promising of any, but whether they will remain free from hereditary disease and debility or not, remains to be proved. Every seed, though taken from the same Apple, furnishes a distinct variety: and some of these will grow with more luxuriance than others, and the fruits produced by the different plants will possess different degrees of merit: but an estimate may be made of their good and bad qualities at the conclusion of the first summer, by the resemblance the leaves bear to the highly cultivated or wild kinds. The plants whose buds in the annual wood are full and prominent, are usually more productive than those whose buds are small and shrunk into the bark; but their future produce will depend much on the power the blossoms possess of bearing cold, and this power varies in the different varieties, and can only be known from experience. Those which produce leaves and blossoms rather early in the spring are generally to be preferred, for though they are more exposed to injury from frost, they less frequently suffer from the attacks of insects, the more common cause of failure.

THE END.

T. Bensley, Printer, Bolt Court, Fleet Street, London.

Variety of Leaves on the same Plant.

Hedera Helix, or Common Ivy.

Edwards del. Warner sculp.

Leaf, wrinkled.

Henderson del. Example _ Salvia officinalis, or Common Garden Sage. Wm. Dunlaguen Sculp.

London. Published by Dr. Thornton May 1st 1809.

Corolla Bell-Shaped.

From the long Pistillum this Flower has very much the resemblance of a Bell.

Leaves in pairs of different sizes.

Atropa Belladonna; or Deadly Nightshade.

Edwards del.

Warner sculp.

London. Published by Dr. Thornton. Decr. 1.1808.

Flowers in an Umbel

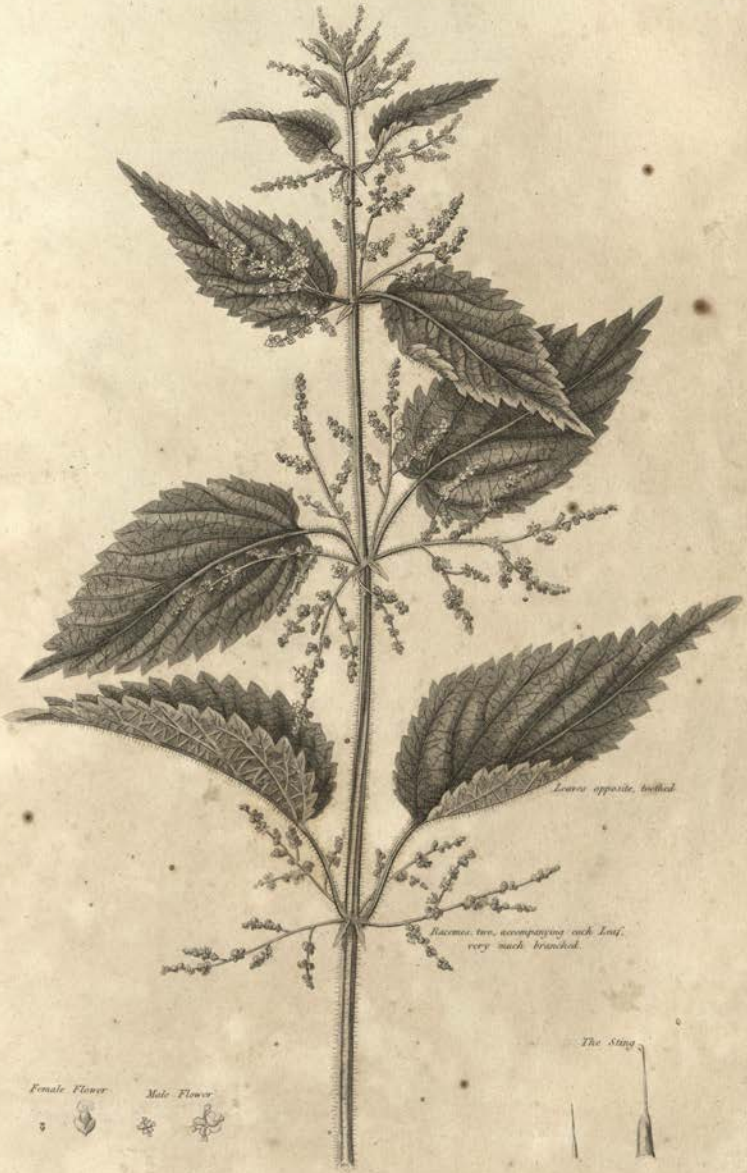
Flower magnified

Involucre magnified

Seed-vessels

Pentandria
5 Stamina
Order
Digynia
2 Pistilla

Scandix Pecten Veneris or Shepherds Needle



Urtica Dioica; or Common Nettle.

Edwards del.

Warner sculp.

London. Published by Dr. Thornton, Decr. 1.1808.

Stem of Lilac inverted.

Henderson del.

London Published by Dr. Thornton, May 1.1808.

Helicteres Isora, or Large fruited Screw Tree.

Henderson del.

London Published by Dr. Thornton Decr. 1.1808.

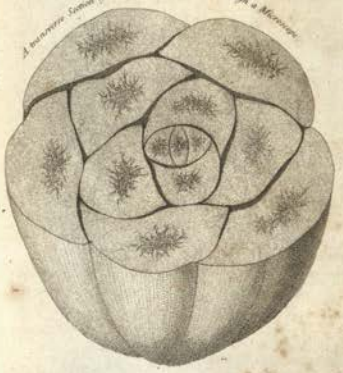
Warner sculp.

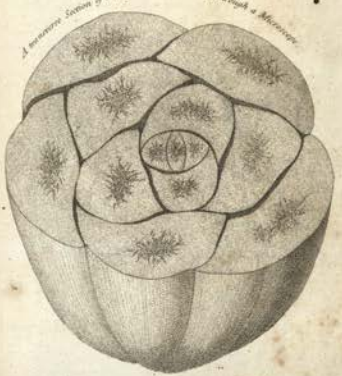
Progress of Vegetation in the Cucumber

3. 4. The Third and Fourth Stages.
These hairy leaves more advanced.

1. First Stage.
a. b. Two seminal leaves.

2. Second Stage.
c. The common leaves at first budding.


A transverse Section of one of these bulbs as seen through a Microscope.


A transverse Section of one of these bulbs as seen through a Microscope.

Root, tuberous.

Example. — Pæonia officinalis, Common Peony.

Henderson del.

Wm. Dunkarton Junr. sculp.

London, Published by Dr. Thornton, May 1.1809.

1. The Bulbous Root, a side View.

The Radicles, shewn in the last plate, cut off

2. D° a little turned up to shew its true Root.

The true Root.

3. D°. stript of its outer Tunic, or skins

4. The Flower contained in the center of the Bulb, as seen in the Month of February.

5. D° in a more advanced state, in the Month of December.

6. Manner in which Offsets are produced, betwixt some of the coats of the old Root

The Offset, or Flower of the ensuing year.

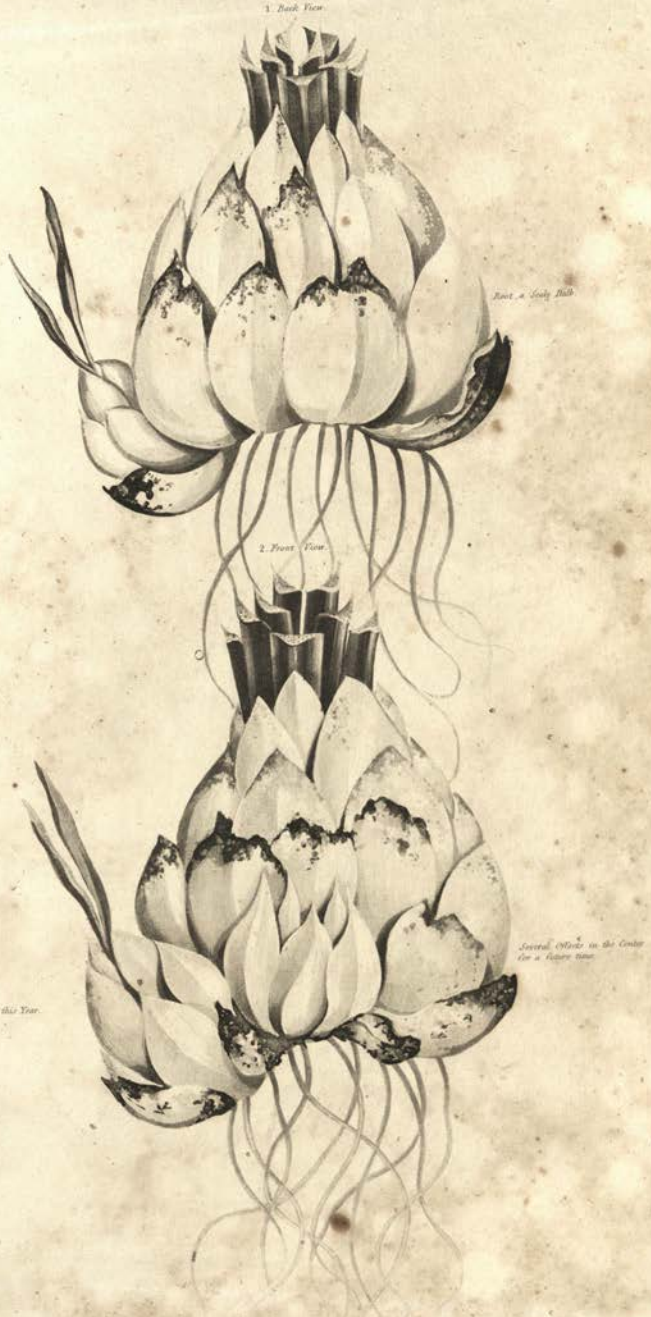
Root of the Hyacinth.

Henderson del.

Warner

London Published by Dr Thornton Augt 1st 1809

Root, of the White Lily.



Root, of the White Lily.

Henderson del.

Sutherland sc.

London Published by Dr. Thornton May 1 1808.

Experiment.

Leaves on one side only

Corn growing against a wall.

Bonnet inven.

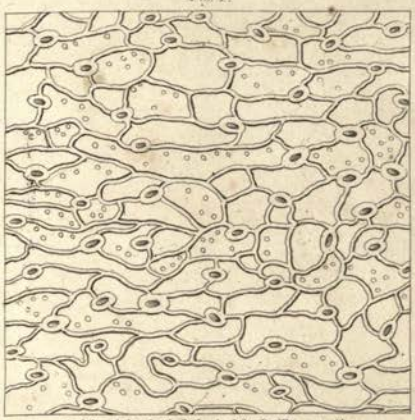
Sutherland sculp.

London Published by Dr. Thornton Aug. 1808

The Organs of Perspiration of Plants.

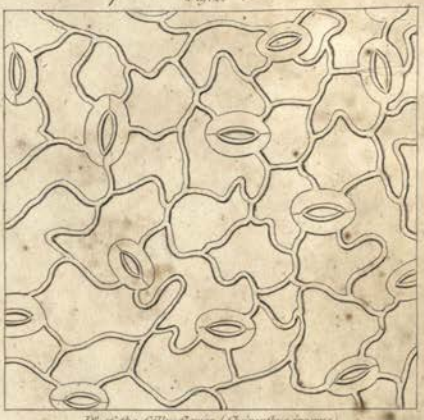
As discovered by the Microscope.

Fig. 1.



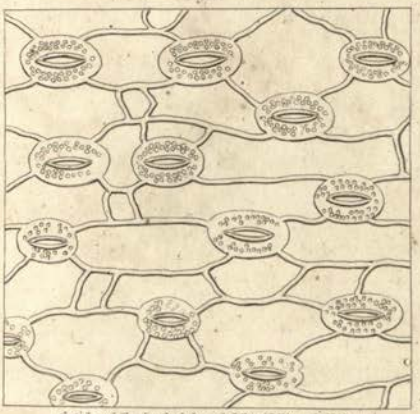
Cuticle of the Seminal leaf of the Perilla ocymoides.

Fig. 2.



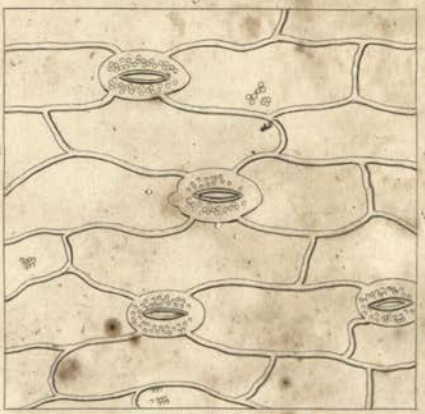
Dº of the Gilly flower (Cheiranthus incanus)

Fig. 3.



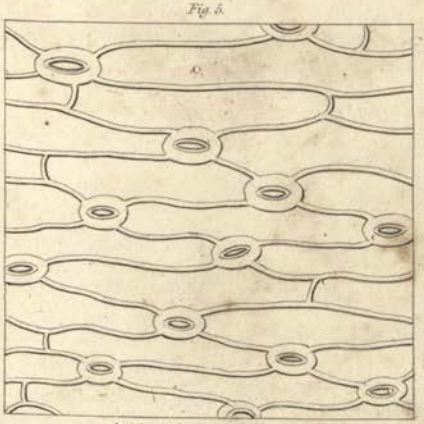
Cuticle of the Leaf of the red Lily (Lilium bulbiferum.)

Fig. 4.



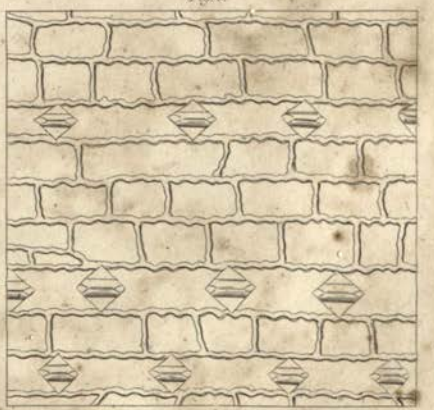
Dº of the Petale of the same Plant

Fig. 5.



Cuticle of the Onion (Allium Cepa.)

Fig. 6.



Cuticle of the Leaf of the Indian Corn (Zea Mays)

Agaricus ovalis.

Agaricus Aruginosus.

From M.Curtis's Flora Londinensis

Thorn axillary

Example Prunus spinosa. Black Thorn.

Henderson del.

Gaugain sculp

London Published by Dr Thornton Dec. 1805.

Thorns, three.

Example Gleditzia triacanthos, three thorned Gleditzia.

Thorns, three.

Example of Gleditzia triacanthos, three thorned Gleditzia.

Sections of the Stalk of the Strelitzia to shew the Pores.

1. Many Tiers of Pores

2. The Same.

3. Four Tiers.

4. Three Tiers.

5. Two Tiers.

6. One Tier.

7. Fewer Pores.

8. The Bottom Part.

9. An oblong Section &c.

Henderson del.

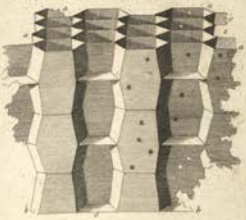
Sutherland sculp.

London. Published by D. Thornton May 1.1808.

Vegetable Anatomy

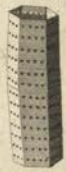
From the Original Paintings in the Museum of Natural History at Paris

1. Cellular Tissue regular & somewhat porous.

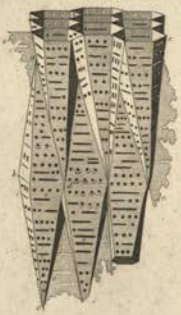


2. Ditto more long & porous.

3. Ditto still longer with regular transverse pores.



4. Ditto Pyramidal with pores & slits.



5. Simple tubes.

6. Tubes with transverse pores.

7. Very large Tubes simple.

8. Ditto with pores.

9. Ditto with slits.

10. Real Trachea.

11. Tube compound.

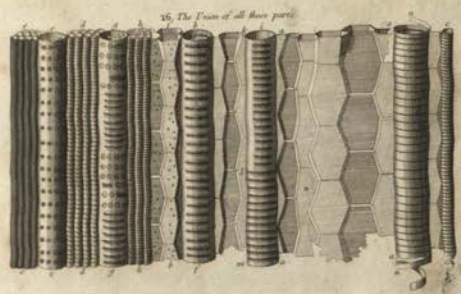
13. Ditto compound & with Trachea.

12. Ditto left compound.

14. Cellular Tissue broken so as to shew a Gap.

15. Ditto the Gap or hollow left perfect.

16. The Vessels of all these parts.



The Vegetable Anatomy continued

17. Epidermis a Cellular texture.

18. Id. with oblong pores.

19. Id. compound with simple tubes.

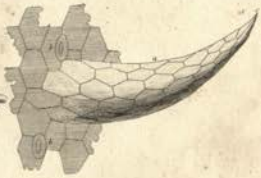
20. The same as Fig 18. with undulated cells.

21. Id. with tubes within tubes.

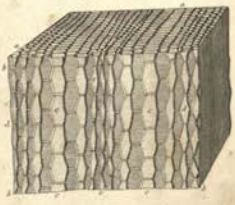
22. Id. with central tubes empt.

23. Horny Epidermis.

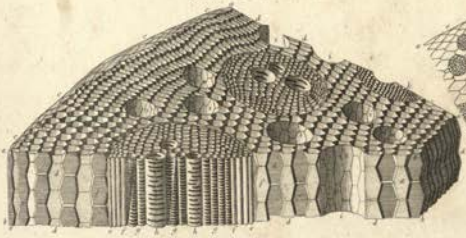
24. Horny Epidermis.



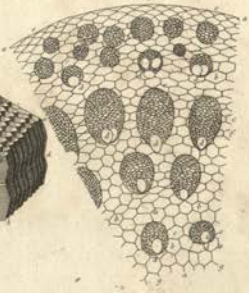
25. Pores fistulosus.



26. Arrenotokum marmor.

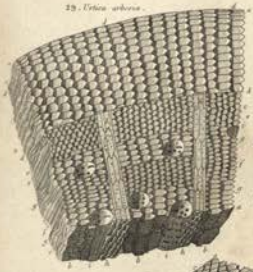


27. Columnæ.

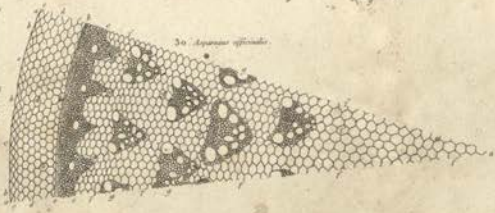


28. Mandibulæ.

29. Vitrea arborea.

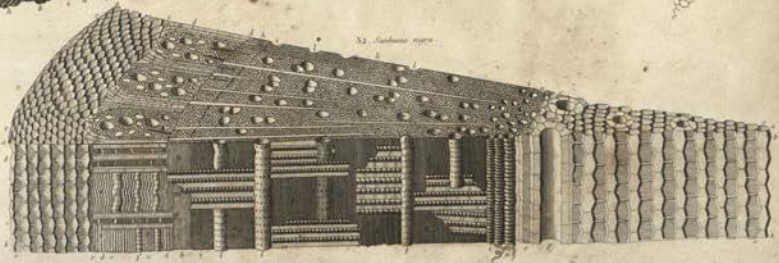


30. Asparagus officinalis.

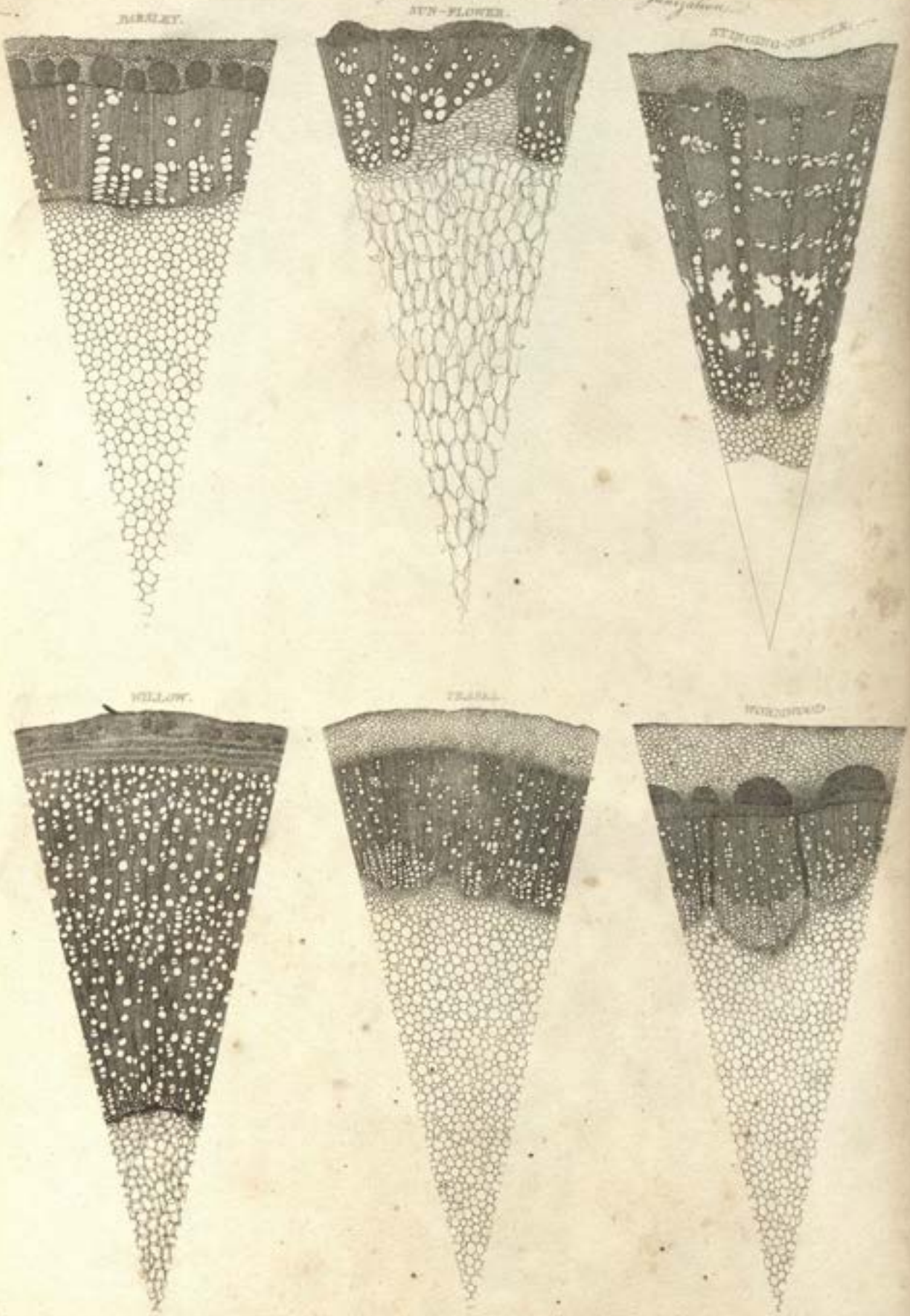


31. Sedum acre.

32. Sambucus nigra.



These Stems still more magnified to show the Vegetable organization.



London, Published by W. Thomas, Sun's, 1818.

These Stems still more magnified to show the vegetable organization.

1. ASH.

2. ASPEN.

3. CHINA.

4. CARROT.

5. ELM.

6. ELDER.

These still more magnified in order to shew more clearly the Anatomy of the Root.

7. PARSLEY ROOT.

8. SUNFLOWER ROOT.

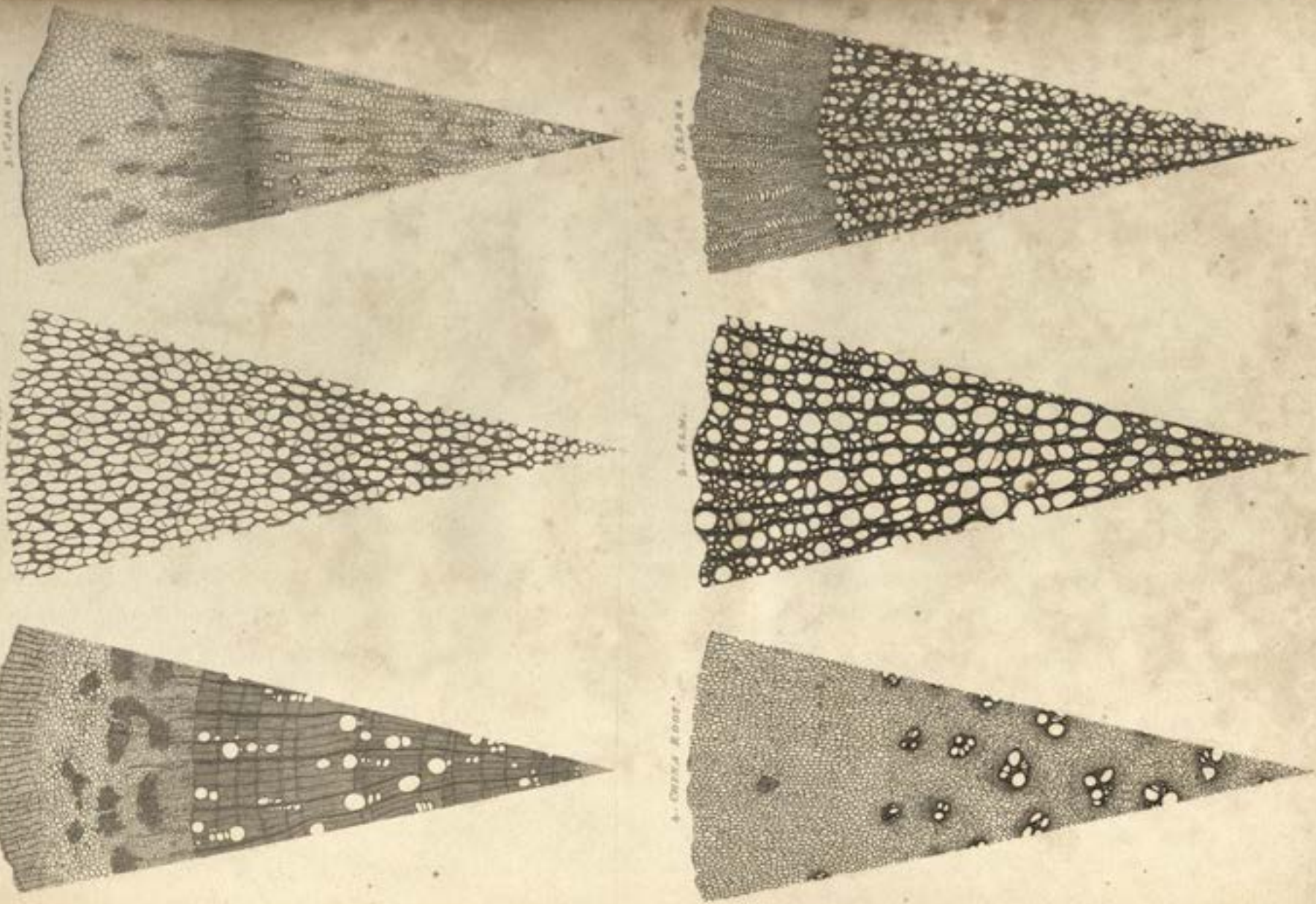
9. STINGING NETTLE ROOT.

10. WILLOW ROOT.

11. TEASEL ROOT.

12. LOGWOOD ROOT.

These Roots still more magnified to show the Vegetable organization.



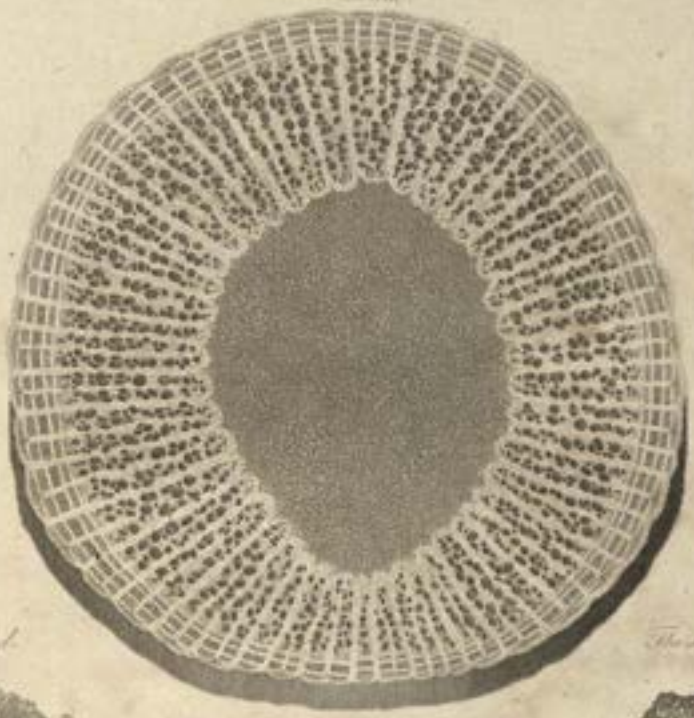
The Organization of the Grape Vine as seen through the Microscope.

With a view to shew its true Structure, and correct the Imperfections of former Representations.

A transverse Section of a Vine Branch upon the opaque Principle.

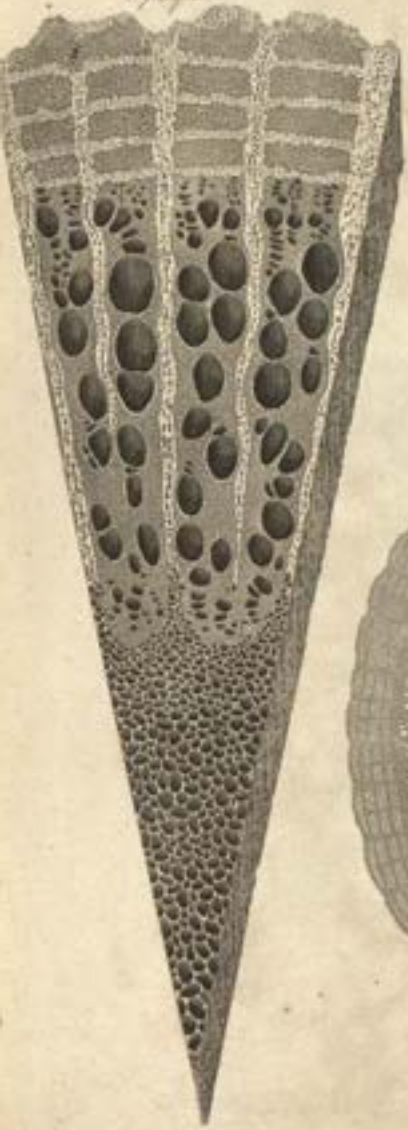
The Bark

The natural size



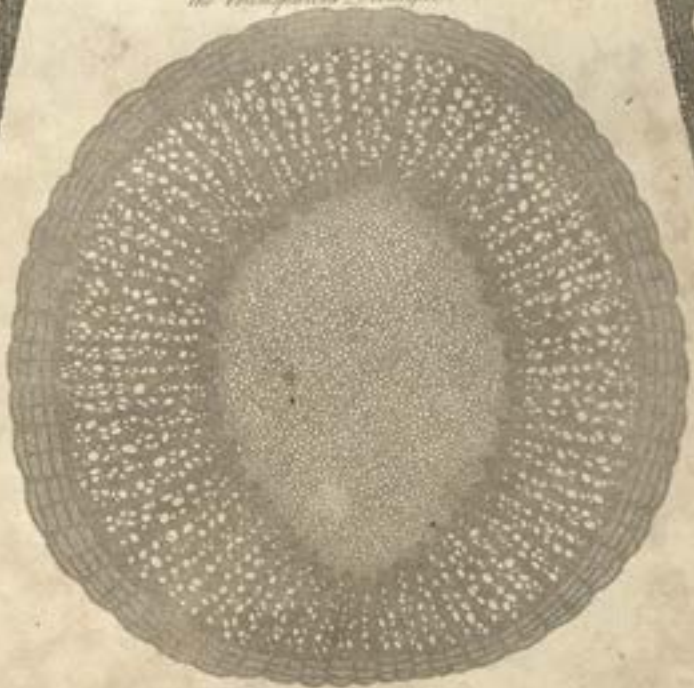
The natural size

The same still more magnified Opaque



A transverse Section of the Bark

A transverse Section of a Vine Branch upon the transparent Principle



The same still more magnified Transparent

The Same still more magnified, to show more clearly the Vegetal or Organization

Transparent Views

1. Charcoal.

2. Fern Root.

3. Bamboo Cane.

Opaque Views

4. Charcoal.

5. Fern Root.

6. Bamboo Cane.

1. ASH.

Transverse Sections of Roots seen through the Microscope.

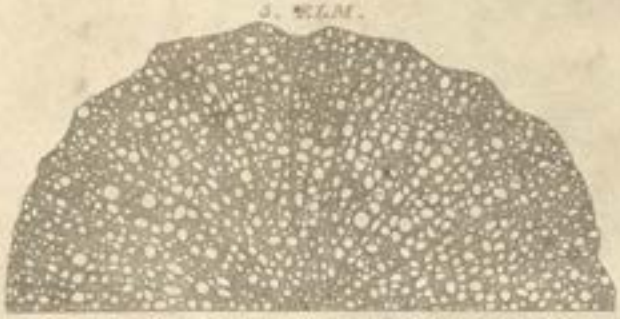
the natural size

2. ASPEN.

3. CARROT.

4. CHINA ROOT.

5. ELM.



6. ELDER.

7. FENNEL.

8. GRAPE VINE.

9. LIME.

10. MULBERRY.

11. OAK.

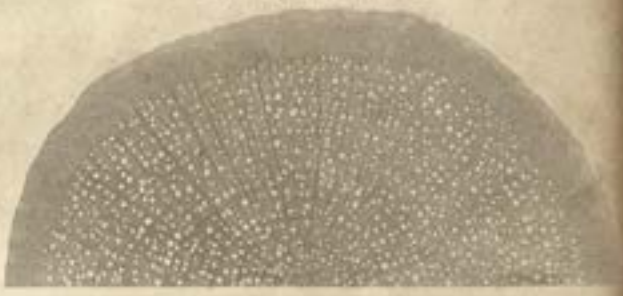
12. AMERICAN NIGHTSHADE.

13. PARSLEY.

14. SUN-FLOWER.

15. NETTLE.

16. SYCAMORE.



17. TEASEL.

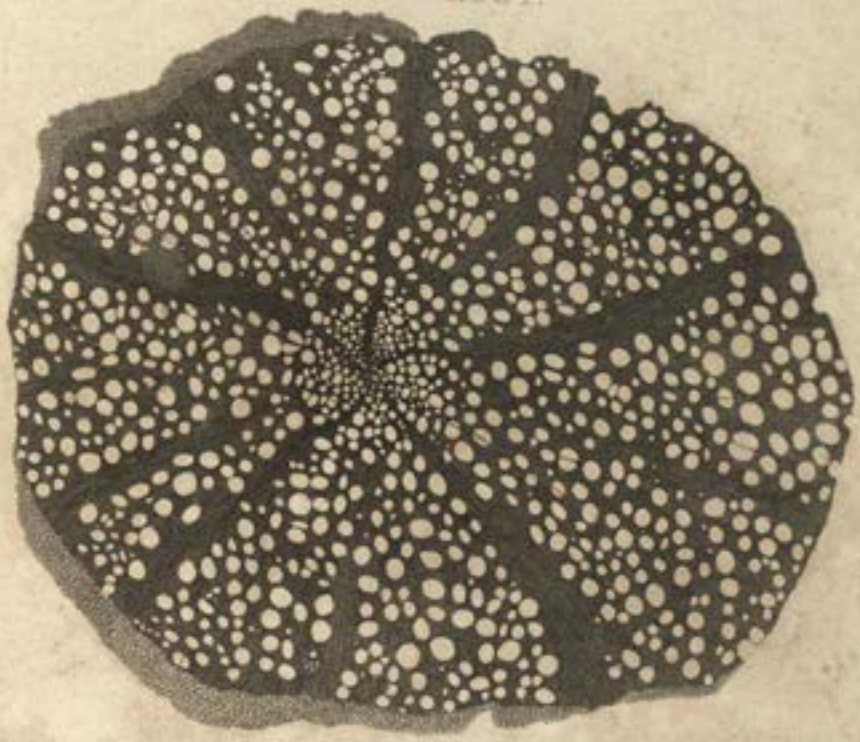
18. WORMWOOD.

19. WILLOW.

20. WALNUT.

Anatomy of the Oak.

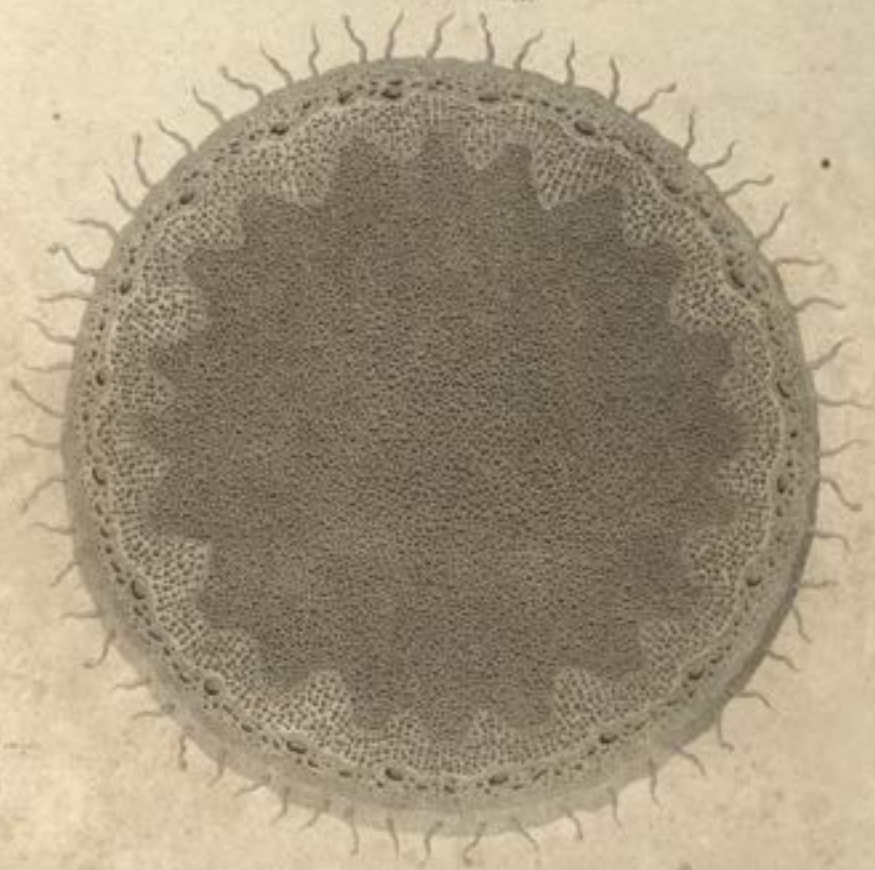
THE ROOT.



THE BRANCH.

Transverse Sections as seen through a Microscope upon the Opaque Principle

SUMACH.



BAMBOO CANE.

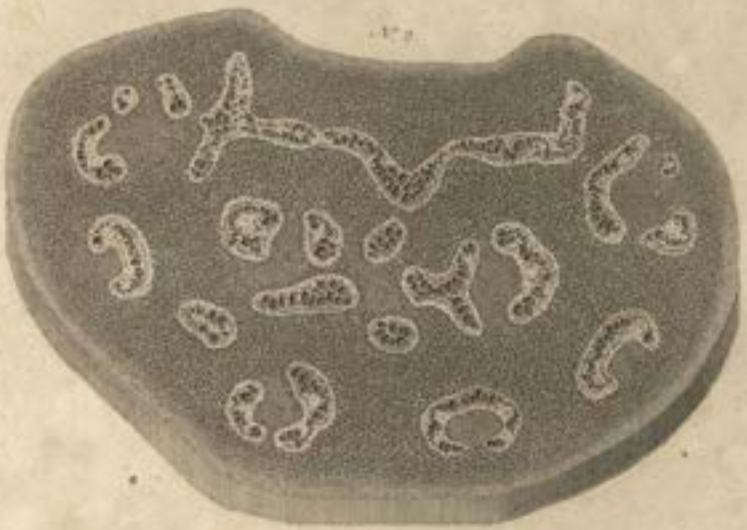
Transverse Sections of Ferns as seen through a Microscope upon the Transparent Principle

N° 1

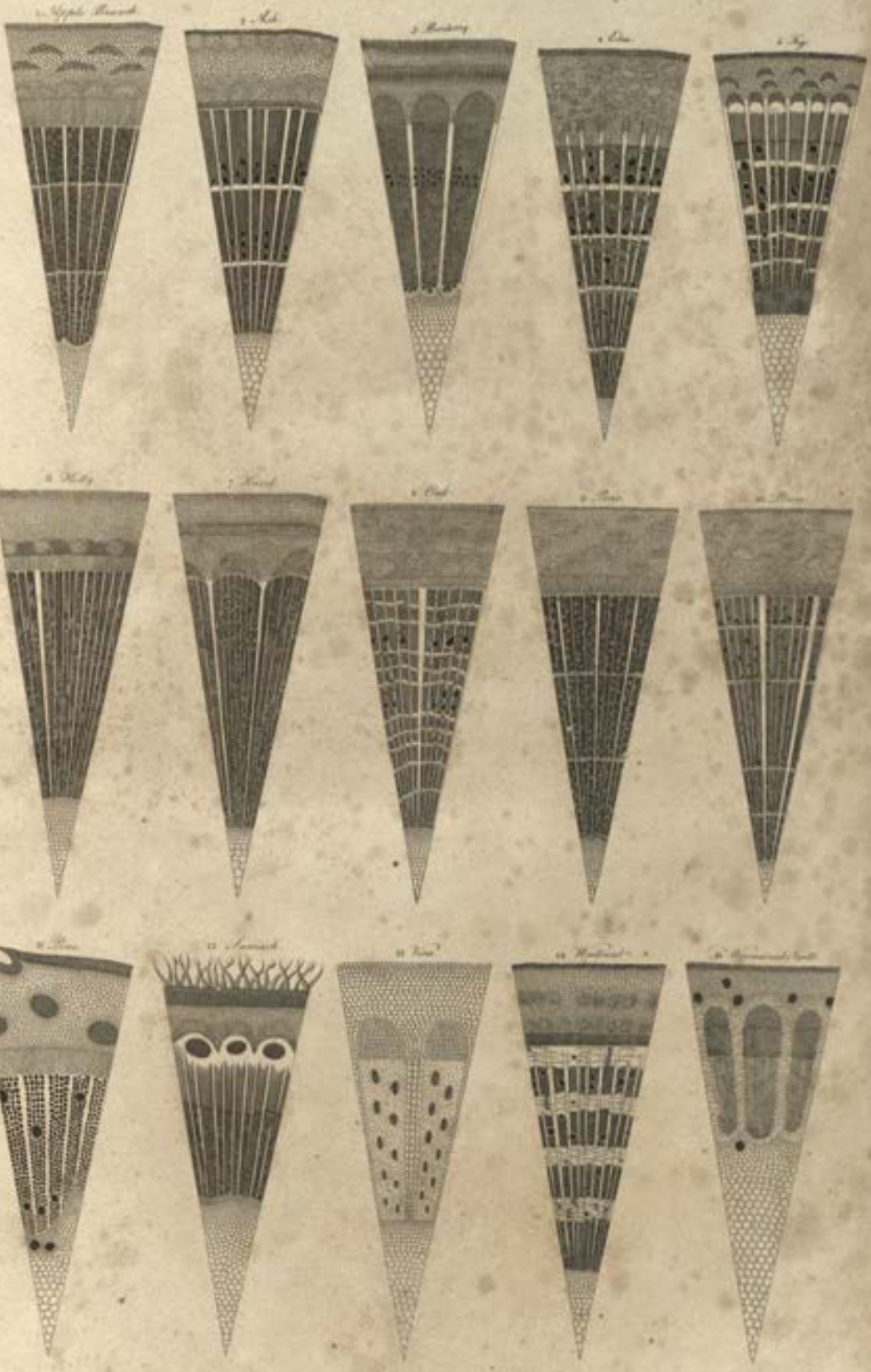
N° 2

N° 3

Sections of Ferns as seen through a Microscope upon the Opaque Principle.



Transverse Sections chiefly of Wood, as viewed through a Microscope, from Grew's Anatomy of Plants.



The Organization of Charcoal & Cork from Hooke's Micrographia.

Charcoal as seen through a Microscope.

A thin slice of the same.

Upon the tangential principle. Transverse Sections of Cork. Upon the transverse principle.

Longitudinal Sections of Cork.

Compressed.

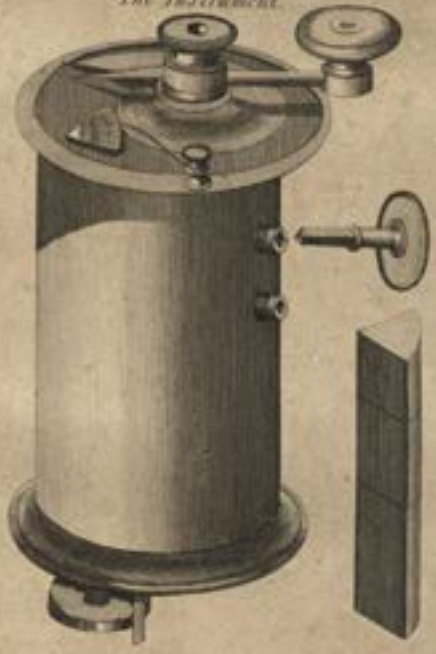
Transparent.

SIR JOHN HILL'S INSTRUMENT FOR CUTTING OF WOODS

FOR MICROSCOPICAL EXAMINATION

Internal View.

The Instrument.



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